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ABSTRACT

This paper focuses on making specific connections between basic social and psychological needs of campus residents and the principles of architectural design that can be applied to the design and renovation of educational facilities. Various research was used to select six "principles of social ecology" that were cross-referenced with five design elements from Christopher Alexander's "A Pattern Language." The social ecology principles and the architectural design elements formed two axes of a matrix, and analysis of research data produced design criteria for each cell in this matrix. The matrix defines why some features are important in campus design and how these features can best be applied. Appendices provide an outline of the matrix and an evaluation feedback survey. (Contains 216 references.) (GR)

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# Social Ecology and Environmental Psychology as Applied to the Design and Renovation of American University Campuses

A THESIS
SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL
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BY

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**ABSTRACT**

After years of budget cuts and deferred maintenance, many American colleges and universities are making significant capital investments in their physical infrastructure. These investments have taken the form of renovation and remodeling of existing facilities as well as construction of new campus facilities. Because of their size and scope, there is a need to maximize the effects of these investments in terms of the resulting social and intellectual development of students and maximization of research productivity on the part of faculty.

For many years it has been known that the design of hospital and health care facilities can have a significant effect on the behavior and well-being of residents and staff. Significant research in social ecology and environmental psychology began in the late 1960's and reached a peak in the late 1970's and early 1980's.

This research project focuses on making specific connections between basic social and psychological needs of campus residents and principles of architectural design that can be applied to the design and renovation of campus facilities. Christopher Alexander's A Pattern Language (1977) provided the taxonomy of a village which was used as a basis for principles of campus design. Research by Rudolf Moos, Robert Sommer, and other researchers in sociology, psychology, anthropology, geography, etc. was used to select six "principles of social ecology" that were cross-referenced with five design elements from Alexander's village taxonomy. The social ecology principles and the architectural design elements formed the two axes of a matrix. Analysis of research data produced design criteria for each cell in this matrix. The results were then posted on the internet for review and application.

It was found that the matrix was very useful in defining why some features are important in campus design and how these features can best be applied. The matrix, and subsequent web presentation, also provided a very concise method of presenting information that can be used by facility planners and architects.

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## CHAPTER ONE

## RESEARCH PROBLEM

### Introduction

American colleges and universities are in a state of turmoil after many, many years of a "steady state" existence. The demand for education, the characteristics of a college education, the funding and support for higher education, and the expectations of a college education remained relatively constant. Many colleges and universities accumulated history and traditions over the years that produced a particular atmosphere about a university campus (and campuses in general).

Then suddenly the baby boom generation came along and the whole atmosphere of higher education was thrown into turmoil. Demand far exceeded supply. Campuses were expanded as quickly as possible to meet the demand. Student retention and graduation rates were of little concern. All possible funding was put into meeting the basic requirements of the "crush" of students on campuses.

But all of that has changed. There is no longer a waiting list to get into most colleges and universities. There have been massive retrenchments in budgets, personnel, and facilities. Colleges have closed, and many others have drastically refocused their areas of emphasis to capitalize on their perceived strengths in what has become a very competitive educational market. And people expect different things of a college education today than they did a decade or two ago. College and university administrators must manage their institutions to meet these expectations with the greatest possible efficiency and effectiveness.

### Professional Context

After many years of neglect, campus facilities are now requiring massive amounts of money for repair to at least minimum levels of safety and comfort. Facilities must also be renovated to meet emerging educational and research needs. College and university campuses are still facing serious difficulties dealing with reduced enrollments and

tuition revenue, reduced outside financial support, rising operating costs, an aging campus infrastructure, increasing competition for a shrinking pool of students, and the appeal of a thriving economy with low unemployment rates. The period of enrollment growth and rapid campus development has ended, and educational administrators across the United States must now focus their attention on making difficult decisions to maintain the financial stability of their institutions. As stated by Harvey Kaiser (1984) in Crumbling Academe:

> The gloomy forecasts of future financial crises are being verified on campuses nationwide. Financially strong institutions are making major sacrifices to maintain the quality of academic programs; weaker institutions and public systems are now in the throes of reducing staff, deferring compensation, and eliminating programs. As a result, maintenance is deferred, renewal and replacement of academic, residential and support buildings ignored, and purchases for replacement of technologically obsolete equipment postponed.
>
> In the current climate of fiscal constraints, resources for capital renewal and replacement are being allocated to preserve the academic enterprise. Meanwhile, the capital assets of higher education are being severely threatened. (p. 11)

Changes in the Landscape--Post-Secondary Education

The financial hardships of the 1980's and early 1990's not only resulted in a crumbling of the physical capital inventory of the institutions, but stimulated a new competitiveness among colleges and universities for a declining market of "traditional" college students. Human and capital resources were required for recruitment of students. Students became buyers who had the upper hand in decisions of where they would be educated.

> Colleges and university are facing an increasingly competitive environment in attracting and retaining students, hiring top-notch faculty, attaining research funding and grants, and sustaining alumni contributions. Planners, facility managers, designers, and administrators are recognizing the important connection between the physical environment and mission. Building a community for learning, teaching, and research must embody a strong sense of mutual purpose and mission. (Worthington, 1998a, p. 11)

Much of the future financial success of college campuses will be based on the ability of colleges to adapt to changing markets and to compete for a diminishing pool of students. To survive, institutions have formed corporate partnerships, modified their instructional formats and/or program orientation to either expand or contract programming, and have focused on generating revenue and/or reducing expenses. Colleges and universities have tried to adapt, up to this point, by enlarging the pool of potential students to include "traditional" and "non-traditional" students as well as by addressing the needs of full-time and part-time students. Higher education institutions have tried to change their market focus also by expanding their programs to include more professional programs and alternative teaching and learning styles, including distance and "just in time" instruction. Finally, some institutions have formed partnerships with corporations in training employees while they are gainfully employed.

These management decisions have most often been based on analysis of institutional strength, analysis of the external environment, and some determination of how the institution's natural strengths can be expanded or focused in a direction that will maintain financial stability for long-term vitality and survival. Smart leaders have tried to capitalize on the unique strengths of an institution while also diversifying the base of support.

So many management decisions and actions are interconnected, but the underlying theme of all of these responses to the changing climate in higher education is to narrow the gap between revenue and expenses. Funding patterns have changed drastically in recent years. Reduced public funding of state colleges and universities has caused a significant increase in tuition costs. To generate tuition revenue, colleges and universities have moved to recruit a full compliment of students to fill classrooms and dormitories and to charge the highest possible tuition without negatively affecting total enrollments. Colleges have also realized that there should be a good match between the institution and the students they recruit because they must retain and graduate these students. It is far more economical, and politically astute, to retain students once they enroll than it is to have high

attrition rates and continually recruit students to replace the ones who have dropped out. It is not cost effective to recruit several students just to get one to pay tuition for four or more years; "graduation rate" is a federally-mandated statistic that all institutions are required to calculate.

For those institutions still relying heavily on the traditional student population, there is full recognition of the intense competition for this market segment. Much greater emphasis and more resources are being devoted to student recruitment than ever before. Student populations are carefully analyzed and indications of interest are aggressively pursued to encourage potential students to enroll at the respective institutions.

Facilities and Campus Climate

The condition and appearance of campus facilities has become the focal point of renewed interest because of the effect facilities have on recruitment and retention of students, as well as the effect of facility costs on total institutional profitability (Hathaway, 1988; Worthington, 1998a). Higher Education was in the "Golden Age" during the 1950's and 1960's. More college and university space was constructed between 1950 and 1975 than in the prior 200 years. By 1988, total college and university space in the United States approximated 3 billion gross square feet, an amount 170 times greater than the downtown office space of the cities of Minneapolis and St. Paul combined. In 1950, college and university facility space totaled 570 million gross square feet and then increased by more than 500% in the next 40 years. (Rush & Johnson, 1990, p. 36)

In contrast to institutions relying on web-based programming, campus facilities influence prospective students of "residential" institutions. First impressions are very important (Norberg-Schulz, 1965). Students have become much more selective in deciding where they will be educated.

> A campus that appears disorganized, uninviting, unsafe, or utilitarian is at odds with the academic reputation the institution must promote. Creating a campus environment that communicates the school's mission and expresses its culture is a meaningful goal; not merely in terms of how

> well the campus functions for the users, but also how it appeals to visitors and attracts prospective students. (Worthington, 1998, p. 11)

Campus environments which are safe and comfortable, support social and intellectual development, and provide the desired "atmosphere" can be more effective, perhaps, in attracting and retaining students than academic programs (Swiger & Klaus, NACUBO Business Officer, March 1996).

> Going to college in America means going *away* to college. It means leaving home and family, usually for the first time. College socializes rebellious teenagers and teaches self-reliance. It introduces the student to a wider world, not only of people and ideas, but also of places. (Rybczynski, 1997, p. 8)

For those colleges and universities which have decided to be competitive with on-campus instruction and residential living, the condition and appearance of campus buildings and grounds has taken on greater significance and importance.

In an often-quoted report done in 1989 on the magnitude of need in campus facilities by the Society for College and University Planning (SCUP), the National Association of College and University Business Officers (NACUBO), APPA: the Association of Higher Education Facilities Officers, and Coopers and Lybrand, the following summary analysis is given:

> It has become clear that American higher education has failed in the stewardship of the facilities assets. Erosion of its buildings and the supporting infrastructure undermines every aspect of an institution's ability to function effectively. To restore those facilities to sound condition and to adapt them to the evolving scientific, technological, and educational needs of our students, faculty, and nation, massive increases in the amounts now spend on repair and renovation will be necessary. (Swinger & Klaus, 1996, p. 40)

In addition to the basic objective of facility renewal, there is now the need to renovate facilities to accommodate new programs, adjust for changing academic disciplines, and support new forms of electronic communication (Swiger & Klaus, 1996). The new generation of students has adopted computers, email, and the internet in much the same way that

previous generations adopted the telephone. This technology is not new to most students entering college these days, and they expect this infrastructure to exist throughout the campus and to be used in all parts of campus life. Colleges and universities must invest in this infrastructure; they won't be competitive in the market if they don't.

Coincident with the renewed interest in the impressions created by campus facilities, there is the recognition that many campuses are at serious risk, physically and financially, because of a serious level of deferred maintenance of campus facilities. Many of the buildings constructed during the boom of the 1970's were built as quickly and cheaply as possible. Cheap construction and deferred maintenance have pushed many of these buildings to an early end of their useful life (Biehle, 1996, p. 26). The combined effect is that maintenance and remodeling schedules are being compressed; older and younger buildings are needing attention at the same time.

A National Association of College and University Business Officers (NACUBO) study done in 1989 indicated it would cost approximately $60 billion to replace and renew facilities on the nation's college and university campuses (Probasco,1991). As a result of this study, much more attention is being given to this significant problem, and funds are being specifically appropriated and/or reallocated to address facility renewal and renovation (Daigneau, 1994; Lamb, 1996).

A recent article by Biddison and Hier (Facilities Manager, November/December 1998, p. 18-23) discussed the need to make efficient use of campus space and to reduce the cost or campus space. Emphasizing the importance of space management, they say:

> One of the largest assets on any college or university balance sheet is its facilities. All told, higher education owns and operates more than 4 billion square feet of space which have replacement value of more than $500 billion. This substantial asset also represents significant costs--to paraphrase the old adage that "time is money," space is money. So clearly, given the size of the facilities portfolio, efficiencies in this area are one of the keys to institutional cost savings. (p. 18)

It is imperative that colleges and universities make more efficient use of campus space by (1) increasing the amount of time space is actually used, (2) by increasing the density of use, and/or (3) by prioritizing how space will be used for campus functions and activities. Biddison and Hier (1998) calculate that it costs $7/sq.ft. to operate and $120/sq.ft. to construct new general purpose classroom space. Space costs money.

Efficiency, Effectiveness and Competitive Advantage

Awareness of facility needs and the need to effectively compete in a very competitive educational market have prompted school administrators to consider how facility renewal funds can be most effectively allocated. Many campus administrators are recognizing that campus facilities should not simply be renewed but that capital funds should be used to perhaps restructure and redesign campus spaces to be more efficient in operation, more effective in achieving educational objectives, more attractive to visitors and prospective students, and more conducive to academic and non-academic development of students. While Castaldi (1969), Biddison & Hier (1998) and others have defined to some extent or another, the balance points in decisions of what to renew, renovate, remodel or replace, it would is useful to consider the research in social ecology by Rudolf Moos and others to determine how campus architecture might promote the desired campus atmosphere and be a productive resource for academic and social development. It is the built environment of the campus that provides the setting for educational experiences and human interaction. And, the capital investment to improve the social and educational environment is often not much, or any, greater than required to maintain and adapt the campus facilities and infrastructure to emerging instructional and research applications.

As noted earlier, there is a backlog of deferred maintenance created by a lack of capital investment in aging buildings and by "expedient" construction during the "boom times". Campuses with the financial resources are taking steps to address this problem not only because it is critical to institutional survival but also for the benefits that might be derived in operating efficiencies and what can

lead to improved effectiveness in achieving the institutional mission. Building efficiency improvements can reduce heating/cooling and mechanical costs as well as improve layout and traffic patterns for reduced cleaning and daily upkeep. Campuses showing elements of cleanliness, organization, and care of facilities create an indirect impression of what goes on in classrooms and dormitories; the old adage that "you never get a second chance to make a good first impression" applies to student recruitment as well as other aspects of life. Students entering college today have much different backgrounds than previous students (Astin, 1993) and need more, or different, intellectual and personal development than previously (as witnessed by employers looking for graduates with more work experience and leadership and teamwork skills). The campus built environment should facilitate this development.

Social Ecology

After accepting the concept that significant investments will be made in college facilities as a result of competition, deferred maintenance, and awareness of the effects of environment on recruitment and retention of students, the next question is how to make necessary improvements. It is important to know what knowledge base exists to assist planners in making campus improvements in anticipation of, and in response to, the challenges of the next century.

The concept of social ecology is one that seems to have importance here. Social ecology is:

> the multidisciplinary study of the impacts of physical and social environments on human beings. Its primary concern is with the enhancement of human environments to improve the quality of human life. It is linked to traditional concerns of human ecology in its emphasis on the measurement of objective physical characteristics of environments and in its emphasis on the short-term evolutionary and adaptive consequences of these environments. It differs from the traditional concerns of human ecology in that its unit of study is the individual rather than the human aggregate or community. (Moos, 1976, p. 31)

Moos and many other investigators have observed human behavior to determine how humans interact and adapt to their physical environment.

The discipline of social ecology emerged in the 1960's and 1970's out of studies done by psychologists and sociologists focusing on person-person and person-environment interactions. Researchers who are cited with great frequency include Robert Sommer, Rudolf Moos, Abraham Maslow, Edward T. Hall, John L. Holland, C. R. Pace, and Urie Bronfenbrenner. Writings by these researchers often focused on the effects of the physical environment on individual behavior. Sommer was one of the early proponents of integration and/or utilization of sociology and psychology research in architectural design.

Deasy (1974), Lawton (1974), and Moos (1976) have written about social ecology in health care and psychiatric facilities and how facility layout and features affect patient behavior. Moos (1979) and many others have also studied and evaluated university dormitory situations to determine how behavior and attitudes are affected by physical surroundings. This work has resulted in concepts and principles of value to those who design and manage human service organizations.

The built environment can do more than simply allow certain behaviors; it can actually promote certain behaviors. Some of these principles have been applied in homes for the elderly to affect behavior of residents with dementia and to improve the overall resident attitude and comfort. Human behavior is not determined by environments, but the environment will define the limits of behavior that might occur in a given setting (W. Michelson, 1970). Tars & Appleby (1973) and Levinson (1978) observed that when the same people are observed in different settings, they usually show considerable variation in their behavior. Sommer, Moos, Deasy, and many other researchers have reported on studies of human behavior relative to physical environments. According to Moos (1976):

> These results support the conclusions that environments may have very important impacts and that people can develop and grow in response to favorable environmental conditions. One cannot overemphasize the extent to which human environments may shape their inhabitants, thus the importance of adequately selecting the environments in which people function. Systematic information about social and physical environments is of utility precisely because people vary

> their behavior substantially in accordance with the characteristics of their social and physical settings. (p. 397)

The five basic components of the environment that affect human behavior are distance, spatial arrangement, amenities, personal space, and territoriality. How individuals respond to these design components is affected by age, sex, culture, and physical limitations, just to name a few. From the studies of human/environment relationships and responses, concepts and principles have emerged to guide the work of those designing the built environment.

Architects have paid attention to research results in sociology and psychology. After the early burst of information from the sociology and psychology disciplines, architects began experimenting and/or writing about design and social/behavioral responses to design features and patterns. Each situation is unique, but architects have clearly attempted to consider, and design for, desired behaviors in their projects (Sommer, 1997; Bechtel, 1997).

Perhaps the most extensive definition of design principles has come from Christopher Alexander in The Timeless Way of Building (1979) and in A Pattern Language by Christopher Alexander, Sara Ishikawa, and Murray Silverstein, with Max Jacobson, Ingrid Fiksdahl-King, and Shlomo Angel (1977). In these writings, Alexander, et al, attempted to define, in functional terms, some principles of design for towns, neighborhoods, houses, and rooms that will promote desired (social) behaviors.

Jane Jacobs and other social and urban development writers have also attempted to define principles of design in terms of social behavior. Jacobs, in her books The Death and Life of Great American Cities (1961) and The Economy of Cities (1969) analyzes city life and urban development in terms of vitality and social behavior. While Jacobs was/is not an architect, her writings have been widely read and supported by practitioners (architects, city planners, etc.). It is appropriate at this time to determine if there can be any direct application of findings from these fields of study to college and university campus design.

Barker and Gump (1964) showed in their research that students at small schools cooperated more closely with fellow students, met more challenges, and developed greater self-confidence than students at larger schools. C. R. Pace (1969) demonstrated that students at large universities had a lower sense of community than students at smaller universities. A. W. Astin (1977) showed that students at large universities were less involved in campus government, less likely to interact with faculty, and less likely to achieve in leadership or athletics. This research on student involvement and community building, and other research like it, lends support to Thomas Jefferson's belief that a university should be a village, not a building. Perhaps some principles of planning and design for village and urban settings can be applied to college campus design.

**Research Problem**

The problem in this study is to determine how research findings in social ecology, environmental psychology, urban development, etc. relate to architectural design and planning of American university campus facilities. On the basis of the preceding discussion, there is reason to consider campus physical environments with respect to desired social interactions and student development. Those campuses intent on survival through marketing of traditional, on-campus student experiences are making major investments in the campus physical infrastructure. It is extremely important that these be wise investments because what is being invested in facilities is being lost from other components of the university. These are "zero sum" budget decisions that must give maximum benefit for every dollar invested.

**Purpose of the Study**

The purpose of this study is to correlate findings in sociology and psychology with regard to person-person and person-environment interactions and to relate these findings to the design of American university campuses. Such relationships have been identified and utilized in the design of hospitals and psychiatric facilities. Some study has been done of campus living environments. This study will

attempt to define broad architectural principles that can be applied to university campuses to promote the desired social and intellectual development of the students, faculty, and staff who study and work in these institutions. Success in this endeavor should make campuses more effective in achieving their stated mission and will assist them in remaining economically viable.

This study will investigate the premise that research concerning the relationship between social interactions and the structure of the physical environment (social ecology) can highlight and/or emphasize architectural design principles for campus facilities to produce a desired campus social and intellectual climate. It is the intent of this research to analyze principles of architectural design, especially as described by Alexander and others in A Pattern Language, and relate those principles to research findings in social ecology in a way that will promote integration of these disciplines in the renovation, and possible expansion, of college and university campuses.

It is the thesis of this paper that the interaction of architectural and social ecology principles points to important areas of concern in campus layout and design which must be addressed by the academy as it develops the campus educational environment. Further, each of these areas of concern can be defined by examples (exemplars) combining architectural and social ecology principles.

**Research Questions**

The questions to be investigated in this study are as follows:

(1) If the campus social and intellectual climate can be affected by the physical environment, as seems to be true by research done by Moos, Sommer, Astin, Tinto, Pace, Pascarella, and others, what are the architectural design principles that can affect this social and intellectual environment?

(2) Are there ways to encourage certain types of student behavior by changing the structure of the campus surroundings?

(3) If certain features seem to cause people to interact socially and others inhibit such interactions, how can such features be strategically placed to promote the desired social responses?

(4) What types of features make people feel comfortable and when, where, and how can these features be integrated into campus/building design for maximum desired effect?

In order to determine the feasibility of using the physical environment of a campus to promote certain types of responses, one must first review research in social ecology and environmental psychology to determine how such interactions might have been observed in other environments.

- What evidence exists to show that human actions/interactions are related to physical design and that desired actions or interactions can be promoted by architectural design?
- Can any of these interactions be applied to college campuses?

Secondly, what are some principles of architectural design that relate directly to expected human behaviors? In designing buildings, several approaches can be used in designing structures that meet client needs and expectations. Not all elements of design apply to social interaction and/or the campus climate we might be striving for, so which elements do apply? What approaches might be applied to the design of university structures which will promote the behaviors identified in the research question?

Next, can the principles of these two disciplines be cross referenced in any way to generate principles of design that will encourage full intellectual and social development of "traditional students" on a college or university campus? Are there examples of these principles being successfully applied? Are there any local examples of architectural features that promote the desired outcomes?

**Significance**

At a time when significant investments must be made in university infrastructure, when strategic planning on campuses is focusing on ways to become more effective and efficient while establishing a "market niche", and when university budget personnel are still trying to reconcile competing demands for limited funds, it is essential that investments in facilities be well-placed. Investments in campus facilities are large and long-term; the effects of these investments

will be felt for many years. It is essential that investments in campus facilities be made wisely and for maximum benefit; it is no longer acceptable to invest only in keeping occupants warm/cool and dry. The results of this study should provide guidelines and examples of how facilities can be designed to improve a campus atmosphere for improved student retention; faculty, staff, and student academic and personal development; and, as a result, improve the probability of long-term development and survival of an academic institution in a world containing increasing numbers of choices and options for the consuming public.

**Summary**

There is a great need for colleges and universities to judiciously invest their capital funds for maximum benefit. The purpose of this study is to correlate findings in social ecology, environmental psychology and related fields with architectural design principles to not only satisfy health and safety requirements but also define person-environment relationships that will promote the desired intellectual and social development of the campus populations.

## Chapter Two
## Review of Literature

The purpose of this study is to correlate findings in sociology and psychology with regard to person-person and person-environment interactions and to relate these findings to the design of American university campuses. This chapter will first review some of the primary researchers who have worked and written on the relationships between people and their environments. The chapter will next summarize research on some primary principles of Social Ecology and their relationship to key architectural features. Finally, literature pertaining directly to person-person and person-environment interactions in a college or university setting will be reviewed.

When discussing the relationships between buildings and occupants, the most often quoted phrase is one made by Winston Churchill, "We shape our buildings; thereafter they shape us." It's unknown how this statement was accepted at the time, but it has been, more or less, stated as fact in more recent times because of research done on human behavior patterns. During the 1960's and early 1970's, researchers in psychology and sociology began observing human behavior as it is affected by facilities. Two frequently referenced researchers in the field of study known as "human ecology" and/or "social ecology" have been Rudolf Moos and Robert Sommer. "Social ecology" tries to understand the impact of the environment from the perspective of the individual while "human ecology" views the interaction from the perspective of the entire community (Moos, 1976). In defining elements of design which will promote desired student development on university campuses, the social ecology perspective will be more appropriate than the human ecology perspective.

Moos, Sommer, and other researchers of person-environment relationships have documented changes in human behavior brought about by changes in physical environment. In gross terms, it is "common sense" that people will move to the most comfortable parts of a room/building, but researchers in sociology and psychology have been able to demonstrate other, more subtle, relationships between environment and

behavior. They have shown that there are changes in human social interaction and social involvement as a result of environmental changes. Initial work by Moos and Sommer focused on patient behavior in mental institutions and nursing homes. Results of Sommer's work, as related to this investigation, include Personal Space: The Behavioral Basis of Design (1969), Tight Spaces: Hard Architecture and How To Humanize It (1974), The Mind's Eye: Imagery in Everyday Life (1978), and Social Design: Creating Buildings With People in Mind (1983). Moos wrote several books, and many articles, about human-environment interrelationships including Evaluating Treatment Environments: A Social Ecological Approach (1974), Evaluating Correctional and Community Settings (1975), Human Context: Environmental Determinants of Behavior (1976), Group Residences For Older Adults: Physical Features, Policies, and Social Climate (1994). Eventually there were also narrowly focused studies of student behavior on university campuses, such as Evaluating Educational Environment (Moos, 1979). Most of the university campus studies focused on residential/dormitory environments and their effect on student persistence, success, and social development.

There has obviously been close review and study of the work done by various researchers in sociology and psychology, because findings have been written about by many architectural authors and applied in some extent or another in architectural design.

Christopher Alexander has carried this analysis into the realm of ultimate application in architecture by his design taxonomy in A Pattern Language (1977). After years of study and segmented analysis with other researchers, Alexander and several associated authors produced a "manual" correlating features with desired environments. This taxonomy appears to be a very good global integration and application of sociological research and architectural design. This integration of social ecology and design should allow us to design a campus environment which encourages and promotes desired behaviors. A possible matrix for this analysis might be as follows (Figure 1).

| | Architectural Design Principles |
|---|---|
| Principles of Social Ecology | |

Figure 1. Axes of the Analysis Matrix

**Architectural Design and Human Behavior**

According to Moos (1976), there are five basic components of design that affect human behavior: distance, spatial arrangement, amenities, personal space, and territoriality. Each of these components has been studied in detail by many different researchers to determine how people respond, and to see if there is consistency to the responses. Adding these components to the vertical axis might expand the matrix as shown in Figure 2.

| | | Architectural Design Principles |
|---|---|---|
| Principles of Social Ecology | Distance | |
| | Spatial Arrangement | |
| | Amenities | |
| | Congruency | |
| | Personal Space | |
| | Territoriality | |

Figure. 2. Principles of Social Ecology-Elements for Consideration

The data for the above elements of social ecology are not constant across all cultures and personalities, therefore this analysis must be limited in its scope, except were cultures and personalities are held in a subdued state. Before discussing and describing these elements in detail, it is important to analyze, at least briefly, the effects of culture and personality on the elements listed in Figure 2.

Personality and Cultural Background

There has probably always been some concern about whether personality and/or cultural background affect the reliability of human responses to the environment. There is evidence that environments affect people differently according to age, social class, cultural background, and personality (Moos, 1976). This conclusion would indicate that the characteristics of the individual must be considered designing a setting. For example, Fried and Gleicher (1961) showed in their research that social class affected how environments are perceived and that environments were/are perceived differently by people of different social class; research by Gans (1967) in Levittown, Pennsylvania, showed how the design of the community might be well received by young adults, but rejected by adolescents. Baxter (1970) and others showed how ethnicity affected the preferred separation distances between people in various situations.

Lang, et al, (1974) indicated that a behavior system will be affected by personality (values, social group, environment, physiology), but personality traits only partially explain different behaviors. Several researchers have shown that personality and other individual difference variables (traits) don't explain variations in behavior (Tars and Appleby, 1973; Hartshorne and May, 1928; Endler and Magnusson, 1976; Levinson, 1978). Endler and Magnusson determined, for example, that only 25% of the variance in such "traits" as honesty can be accounted for by consistent individual differences. Moos (1979) concluded that personality only partially explains behaviors in specific settings.

Because personality and cultural traits can affect responses/behaviors in a given physical environment, even though the effect is considered minor in relation to design factors, it is appropriate that this study be more narrowly focused on the college and

university environment. Since there is relatively little direct research on social responses to design elements in a university environment, except for residential environments, it seems appropriate to cross reference the social ecology principles of distance, spatial arrangement, amenities, personal space, and territoriality with design features and then look for verification of behaviors in university environments. While certain aspects of architectural design will affect behavior, behavior must be considered within the context of the characteristics of the faculty, staff and students who will populate the environment. For this research, the investigation will center on a residential campus with "traditional" students and programs.

Distance

Distance is most directly related to social interaction and social group formation. Deasy (1974) pointed out that social contact is seldom limited to areas that are formally designated for such purposes and that the challenge is to identify where contacts occur and how the aspects of the design sustain and support such contacts (p. 35-37). Festinger, Schachter and Back (1950) concluded that friendships will depend on the occurrence of passive contacts, and the patterns and frequency of passive contacts among particular people will depend on the ecological factors of physical and functional distance.

In general, one might say that shorter physical and functional distances (as perceived by the user, not the designer) promote interactions among people and the formation of friendships. W. H. Whyte (1956) found that short distances and face-to-face orientation of home entrances were characteristic of party groups in suburban Park Forest. Distance and orientation of workers affects the amount of interaction between workers. Closed areas have more interaction and feel more secure, but open areas offer wider friendship choices and less personal animosity (Moos, 1976).

Social interaction and/or conversational distances are affected by many factors including room density, the acquaintance of the individuals, the personalities of the individuals, etc. Much of this interaction is related to the concept of "personal space", first formulated by Simmel in the early 1900's. Violations of personal space

produces accommodations and responses according to feelings of territoriality, relative dominance between the invader and victim, and/or attributions of sexual motives of the invader (Felipe and Sommer, 1972). Felipe and Sommer came to these conclusions experimentally by watching subjects in mental hospitals and watching subject reactions to invasions of their personal space.

Many other observations have been made regarding conversational distances which may influence facility design. Baxter (1970) observed that Mexican-Americans were comfortable with less interpersonal separation than Anglo-Americans (more) or Black Americans (most); Little (1968) observed that social interaction distances for people of northern European cultures were significantly larger than for people of Mediterranean cultures. E.T Hall (1966) observed that the "zone of comfort" varied according to familiarity of the parties and the nature of the transaction.

This analysis demonstrates, among other things, that knowledge of the effects of functional and physical distance can be useful in promoting group formation encouraging involuntary, casual contacts between people. These interactions encourage and develop recognition and feelings of affiliation thus promoting further social interaction and group formation.

Spatial Arrangement

Amos Rapoport (1977) stated that spatial organization is a more fundamental aspect of the designed environment than shape, materials, and other elements of design. Observations by Felipe and Sommer (1972) on "flight" demonstrated that spatial invasions have a disruptive effect and can produce negative reactions. Festinger, Schachter, and Back (1950), after their study of several different types of housing concluded that: "the relationship between ecological and sociometric structure is so very marked that there can be little doubt that in these communities passive contacts are a major determinant of friendship and group formation." (Wells (Gutman, ed.), 1972, p. 102); Festinger later concluded, however, that the influence of spatial organization might be more uncertain and variable and related to the homogeneity of the group (i.e., social cohesion is less likely with a socially heterogeneous

group) (Gutman, 1972, p. 120). Fundamentally, spatial arrangements which restrict sensory contact are associated with less social interaction between/among occupants.

Buildings will encourage interaction through compact layout and central areas where people can gather (Moos, 1976). Distance and orientation of spaces, partial walls, etc. which form barriers to sensory contact will reduce the likelihood of social interaction and friendship formation. Furniture arrangement and overall arrangement of the space can be used to positively or negatively affect behavior. Seating arrangements, for example, as found in airports, train and bus stations, discourage personal contact, whereas moveable/clustered seating tends to encourage social interaction (Deasy, 1974; Moos, 1976).

In educational settings, Myrick and Marx (1968), Getzels (1974), and others have studied campus and classroom design for factors which develop cohesive or isolating behaviors and affect levels of involvement in the educational process. Myrick and Marx studied interactions in classrooms and halls, stairs and lobbies of three types of high schools and found that more interactions occurred in and out of the classroom in the high school with a cohesive building structure and a central area where students could gather between classes. Getzels studied classroom configurations and what types of images are presented to students; their conclusions was that the more open the classroom in its configuration, the more open the learning process.

Amenities

"Amenities" refers to color, comfort, carpeting, and other features which create impressions in the minds of the occupants. Maslow and Mintz analyzed student perceptions of "energy" and "well being" of faces as viewed in different surroundings (Maslow and Mintz, 1956) and found that perceptions were different depending on the beauty or ugliness of the associated surroundings. Tognolli (1973) found similar responses to furniture placed in different surroundings. Others, like Kasmar, Griffin, and Mauritzen (1968) and Tognolli (1973), also determined that situations will be interpreted differently depending on the context or environment of the situation. On a broader scale (e.g. neighborhood), researchers Foote, Jughod, Foley, and Winnick (1960)



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determined that physical amenities had little to do with resident preferences; most residents were satisfied or dissatisfied with their neighborhoods because of the social characteristics of their neighbors.

Congruency

Finally, there must be congruency in the design of space. Space is more likely to encourage behavior if the behavior is congruent with personal preferences/goals; if it isn't, people will: (1) change the environment, (2) change their image of the environment, or (3) move to another setting that is more congruent (Moos, 1976). In other words, there is a need to examine the setting and the individuals when estimating the impact of a particular environment.

Everyone forms impressions and expectations of restaurants, department stores, and shopping areas based on the features and design of the space; if the reality does not match expectations, stress and uneasiness is generated. Fried and Gleicher (1961) demonstrated that different social classes view the same environment differently. Housing designed for young families is often not suitable for young singles or the elderly. The design of space must be congruent with user goals to be effective.

Personal Space

Investigations of personal space began in the early 1900's with Simmel and were investigated empirically by several social scientists in the 1930's (Felipe & Sommer, 1972; Bechtel, 1997). First indications of personal space were seen through observations of animal behavior. Edward T. Hall (The Hidden Dimension, 1966) studied interpersonal distances and termed the study "proxemics"; he based his conclusions on observations and intuition, rather than experimentation (Porteous, 1977). Hall defined various interpersonal distances in terms of the activities which normally take place at those distances (intimate, personal, and social). These distances were defined as norms for middle-class American society.

In 1969, Robert Sommer picked up on Hall's general notions of personal space. He started his observations in public places and then moved to observations of seating patterns/tendencies in controlled environments. Sommer considered personal distance to be a "bubble"

surrounding each individual based on sensory zones, i.e., distances determined by visual, olfactory, and oral cues. Most recent researchers (Aiello, 1987; Hayduk, 1983; Bechtel, 1997), however, have concluded that the bubble concept is misleading and unsupported.

There is variability in the size of the personal space zone according to: culture, personality, race, age, sex, psychiatric disorders, degree of competence, the type of interaction, what one is used to, social influence, ego state, environment, and degree of affinity between interactors (Lawton, 1974; Moos, 1976). Personal space size and intensity may vary over time, on a short-term basis, according to ego state and mood (Porteous, 1977).

Barash (1973) suggests that there may be conflicting reactions to invasions of personal space due to perceptions of the overall appropriateness of the spatial arrangement, according to the amount of space available, and the status, sex, relationship, and intentions of the invader (Moos, 1976). There may be different expectations of appropriate personal space for different settings. Personal, interactive space is flexible, mutually adjustable, and situationally influenced. A large body of literature has been written that at least demonstrates the importance of distance between people and how personal distance is influenced by the way a situation is defined by culture, the assumed motive of invaders, and the presence or absence of other persons (Bechtel, 1997). People do not always feel anxious when strangers sit close by (Moos, 1976).

Most researchers have treated interpersonal distance and personal space as almost synonymous, but Strube and Werner (1983) stated that there is no relationship between interpersonal distance and personal space; their belief is that interpersonal distance will be greater from others who may be a threat or wish to control the person. In their 1984 study, Strube and Werner described how people will expand personal space in the direction from which a threat comes (Bechtel, 1997).

Violations of personal space will usually lead to increased tension, uneasiness, and/or arousal. Regardless of the cause, people will attempt to reduce uneasiness and arousal to a moderate level (Veitch & Arkkelin, 1995). Responses to invasion of personal space

generally fall within the categories of "flight" or "fight", with "flight" resulting in physically leaving the area or withdrawing psychologically ("cocooning") and becoming mentally removed from the situation by filtering out or ignoring unwanted contacts. Cocooning is not desirable, however, because it separates the person from reality (Deasy, 1974).

Territoriality

The study of person-environment relationships is known as "proxemics" (Hall, 1966) and includes issues such as personal space and territoriality. Although personal space and territoriality might appear to be synonymous, there is a difference in definition and social response. Personal space is carried around, but territories are relatively stationary (Bechtel, 1997; Veitch & Arkkelin, 1995, Felipe & Sommer, 1972); territories are usually marked to be visible, while personal space is invisible; the body is the focal point of personal space while the home, or some other element is the focal point of a territory (Veitch & Arkkelin, 1995). There is no indication that territoriality is inherited, but this concept has far-reaching implications on person-environment interactions.

The use of space organizes human behavior, allowing tasks to be done without interference and promoting and/or facilitating development of an identity. Territoriality might be a privacy management mechanism (Altman, 1975) or it might be a means of distancing according to Hall's proxemics (Bechtel, 1997). Two of the most important concepts to emerge from the study of animal behavior and space are "territoriality" and "dominance," and some interesting relationships have been shown in human behavior. There is an interesting parallel which shows that territoriality and dominance are ways of maintaining social order, and when one system cannot function, the other takes over (Sommer, 1969).

"Territoriality, involving the exclusive control of space by an individual or group, is intraspecific, involves aggression, and confers valuable privileges" (Porteous, 1977, p. 30). Defense and personalization (identity) are two criteria for territoriality. Identity relates to a desire to be recognized by others as an

individual, member of a group, or of certain status (Sommer, 1969; Porteous, 1977).

Three types of territories that have been identified: public, home, and body. Public territories tend to have freedom of access because of citizenship, but not of action--certain images and expectations regarding behavior come with the access. Home territories provide relative freedom of behavior and a sense of intimacy and control over the area; these areas are often defined through regular use by specific persons or categories of persons and may be public space that was "colonized." Body territories are the most private and inviolate of territories belonging to the individual, the anatomical space of the body (Gutman, 1972). The first two of these have significance with regard to facility design and planning.

Social Ecology in Educational Settings

Moos (1979) identified several research studies of design in educational settings and concluded that "All authors agree that the social-ecological setting in which students function can affect their attitudes and moods, their behavior and performance, and their self-concept and general sense of well-being." (p. 3). Studies of relationships between behavior and design by sociologists and psychologists seem concentrated in the 1960's and 1970's time frame. According to Robert Sommer (1997), social ecology, also known as "environmental psychology", has gone through a cycle of great interest, to low interest, and now back to renewed interest. In this cycle, this field of study has also achieved some level of maturity.

While Frank Lloyd Wright promoted the idea that "form must follow function", it is clear from some of his designs that he did not always consider the user in his design, but rather expected the user to adapt to the design. "Not only must form follow function, but it must assist it in every way." (Sommer, 1969, p. 5). While many consider some of Wright's designs to be inspirational and timeless, those works considered to be inspirational and timeless, upon investigation, are most likely those which best integrate the artistic with the functional, from the user's point of view.

**Social Ecology and College Campus Design**

In reviewing literature relating building design to human behavior, it can be seen that many scientists and architects have written on the subject. Some researchers focused on human response to architectural features, and others concentrated on designing for certain behaviors. In each perspective, the studies have usually been narrowly focused and referred to nursing home design, office layout and configuration, housing/home design, campus housing, and other situations which are unrelated or defined in such a way so as to be of little value in the overall design and layout of a college campus to achieve results as stated in Chapter One.

Thomas Jefferson argued that a university should not be a building, but a village. Werner Sensbach (1991) stated:

> I believe the style of the campus buildings is important; but style is not so important as the village-like atmosphere of all the buildings and their contained spaces. University leaders must insist that architects they hire design on a warm, human scale. Scale, not style, is the essential element in good campus design. Of course, if an inviting, charming campus enclosure can be combined with excellent, stylish buildings so much the better. (p. 11)

In readings on urban development by Jane Jacobs and other architects and planners from the same school of thought, it appears that the village concept of campus development and design might have merit in promoting the types of interactions and social climate so desired on a campus. To further this analysis, the taxonomy of design developed by Christopher Alexander, et al, (1977) may provide a road map to some principles of design for college campuses.

Alexander's Pattern Language provides a listing of features associated with the "village" concept of design such that we may be able to associate specific features with certain behaviors. Kevin Lynch, in The Image of the City (1960), found that, in terms of cognitive mapping, people's images of cities usually contained five distinct elements: paths, edges, districts, nodes, and landmarks. Not all studies have demonstrated the importance of all five cues. Studies by Norberg-Schulz

(1971) suggested two clusters (a structured center and a periphery); Siegel and White (1975) found their cues fell into 3 categories: routes, nodes, and configurations. Rovine and Weisman (1989) concluded that, regardless of clustering or anchoring, each unit of information has in its center a landmark (Bechtel, 1997). In terms of designing a campus that is easy to navigate and establishes a connection with visitors and "residents," such findings may be useful.

Five design patterns identified by Alexander for communities with populations of 7,000 closely parallel the elements identified by Lynch and other researchers of cognitive mapping. We may be able to reference these patterns to social ecology principles for desired behavior: neighborhood, activity nodes, promenade, paths and roads, and sacred sites. These features are identified in the first level of analysis because they appear to relate closely to desired outcomes of campus design.

Neighborhood

It seems logical to think of neighborhoods as being equivalent to departments and/or colleges on a college campus. There is a natural search for identity by faculty and students with a point of location that outsiders will recognize. This is the same premise as Alexander's element of design; people want/need an identifiable spatial unit to belong to (Alexander, et al., 1977). On a college campus this can be an academic department, a housing unit, athletic activity, or other physical unit with a designated function or purpose.

Activity Node

Studies of pedestrian behavior have shown that people seek out concentrations of other people, whenever possible. Deasy (1974) cites work done by Derek Phillips (p. 50) in which Phillips concludes that happiness is correlated to social activity; people who report a higher incidence of visits among friends, a higher incidence of organization membership, a higher incidence of people known in the neighborhood, consistently reported greater happiness than those who did not have the benefit of such contacts.

Activity nodes will exist where paths intersect or converge. Paths will usually converge where symbiotic groups are clustered;

symbiotic groups tend to attract the same kinds of people at the same time. It is also common that nodes will be dispersed across the community and paths will tend to converge on these areas.

Promenade

This category is not a clear match or equivalency with Lynch's "edge", but is chosen because the promenade can form an edge by it location and function. By this category, Alexander refers to the need of every culture to have a place where people can go to see people and to be seen by people. Usually promenades will have major attractions at each end. This is a way for people to share a community of spirit. Promenades have high densities of people and activity nodes along its length.

Paths and Roads

Alexander suggests that paths and roads are really not compatible, and wherever possible, paths should be at right angles to the roads to form a second network for connecting places. Roads can be parallel or looped, and paths can connect roads with each other and with activity nodes.

Sacred Sites

People need physical reminders and connections to their roots and their past. Rules should exist that will protect these sites, and, where possible, sites should be a series of spaces that gradually intensify the feelings of heritage and tradition.

**Design Matrix**

In defining the relationships between the social science perspective of campus design and the architectural perspectives of design for desired social behavior, it might be useful to use a matrix to consider the social ecology design principles against Alexander's taxonomy of design to see if there are design features of a campus that match both references and might promote/produce desired behaviors. By analyzing readings in both fields of study, specific design recommendations might be made, and examples might be found, which can be applied specifically to college/university campuses.

Grady Clay (1994) has developed some generic classifications of urban space based on writings of J. B. Jackson of *Landscape* Magazine, Gordon Cullen of the British magazine *Architecture Review*, and of Jane Jacobs. Clay's classifications are interesting (the "Center" with "back there, patches, and perks,"; the "Front", and "Out there") , but seem much too focused on the city/urban situation and too vaguely defined to be of much help in this endeavor. It seems that Alexander's taxonomy has the greatest precision and flexibility for this type of analysis. An example of a proposed matrix for this study is shown below (Figure 3).

| | | Architectural Design Features | | | | |
|---|---|---|---|---|---|---|
| | | Activity Nodes | Neigh-borhood | Promenade | Paths & Roads | Sacred Sites |
| Principles of Social Ecology | Distance | | | | | |
| | Spatial Arrangement | | | | | |
| | Amenities | | | | | |
| | Congruency | | | | | |
| | Personal Space | | | | | |
| | Territoriality | | | | | |

Figure 3. Design Matrix

At the conclusion of this study, each of the boxes in the matrix should contain: (1) a definition of the design principle, (2) evidence of the design principle, and (3) an example of the principle in use.

The review of literature on this topic has only begun, but several observations provide support for the position that this analysis can be productive:

(1) psychologists, sociologists, and architects have all written about the relationships and effects of design on human behavior,

(2) writings seem extensive and fairly balanced by writers in each of these fields,

(3) relating campus design to design of a village seems to have credibility among sociologists and architects for maximizing the effects of campus design because authorities in these fields have studied and written about it, and

(4) new methods of analysis, such as NUD*IST software, should allow better review of information for appropriate relationships and confirmation of "accepted" practice.

Based on the literature review thus far, it appears there should be ways to analyze work done by psychologists, sociologists, and architects to develop guidelines and principles of design that can be applied to campus and building planning for the purpose of encouraging the personal and social development of the students, staff, and faculty working there. If this can be accomplished, colleges and universities will have an opportunity to improve the effectiveness of investments they are being forced to make in campus infrastructure. Such investments will also improve student academic and social development and the overall quality of graduates as viewed by their success "in the marketplace."

## Chapter Three
## Method of Study

### Research Problem

It is the intent of this research to analyze research findings in social ecology, environmental psychology, architectural design, etc. and to formulate principles that integrate these disciplines for more effective renovation, and possible expansion, of college and university campuses. It is the thesis of this paper that the interaction of architectural and social ecology principles point to important areas of concern about the campus environment and/or design which must be addressed by the academy for the long-term success of the institution and its constituents. This is especially true for campuses addressing the needs of traditional, residential students, but is also important for all types of campuses providing post-secondary liberal and professional education.

As stated previously, the problem in this study is to determine how research findings in social ecology, environmental psychology, urban development, etc. relate to architectural design and planning of American university campus facilities. There is reason to consider campus physical environments with respect to desired social interactions and student development. Campuses intent on survival through marketing of traditional, on-campus student experiences are making major investments in the campus physical infrastructure. It is extremely important that these be wise investments because what is being invested in facilities is being lost from other components of the university. These are "zero sum" budget decisions that must give maximum benefit for every dollar invested.

The purpose of this study is to correlate findings in sociology and psychology with regard to person-person and person-environment interactions and to relate these findings to the design of American university campuses. Such relationships have been identified and utilized in the design of hospitals and psychiatric facilities. Some studies have been done of campus living environments. Using the matrix in figure 3, this study will attempt to define broad architectural

principles than can be applied to university campuses to promote the desired social and intellectual development of the students, faculty, and staff who study and work in these institutions. Success in this endeavor should make campuses more effective in achieving their stated mission and will assist them in remaining economically viable.

The question of this research project now is whether the matrix of environmental psychology principles and architectural design principles can be completed. It is expected that for each box in the matrix: (1) evidence will be evaluated, (2) a design principles will be defined, and (3) an exemplar will be identified.

**Methodology**

Research Method. This will be a grounded theory analysis following the principles of Glaser and Strauss (1967). Based on research in sociology, psychology, and other disciplines of study which relate human behavior to physical environments, some "theories" of behavior will be generated focusing on the college and university campus environment. Human behavior patterns that have not been shown to be site-specific (hospitals, nursing homes, unique public places, etc.), will be analyzed with regard to their possible application in the university environment. Behavior patterns that have been shown to be site specific will be analyzed with regard to similarities in the environments and possible application to the campus environment.

Review of the Literature. The analysis of the research question will be based on a review of research and literature in psychology, environmental psychology, sociology, social ecology, environmental sociology, urban planning, and architecture to determine common themes relating principles of architectural design and desired human/student behavior. It will be necessary to first identify how social behaviors are affected by physical design features and then to select design principles, or rules of design, that relate to these behaviors.

What data exist to show that human actions/interactions are related to physical design and that desired actions can be promoted by architectural design? Is there any evidence that design features on college campuses can be used to promote desired behaviors? How has

design been used in the past to influence human behavior. What have been the circumstances of these efforts? What are some principles of architectural design that relate directly to expected human behaviors? Have there been any applications in university settings? Not all elements of design apply to social interaction and/or the campus climate we might be striving for, so which elements do apply? What approaches might be applied to the design of university structures which will promote the behaviors identified in the research question? Literature on this subject is spread over several disciplines.

As stated in Chapter 2, research efforts in the effects of the physical environment on the behavior patterns of inhabitants peaked in the mid-1970's when there were many books and publications on the subject, and there was active interest in this research by the architecture community (Sommer, 1997). Because the research was being done in so many disciplines, however, it was hard to track, especially when researchers found it hard to be tenured in this field of specialization and therefore concentrated their publication efforts in their home disciplines (Bechtel, 1997).

Synthesis of the Literature. The literature will be analyzed and categorized in a matrix relating behavior patterns to architectural design features and/or guidelines. Literature from the fields of sociology, psychology, and architecture will be analyzed using QSR NUD*IST 4 software (Non-numerical Unstructured Data by Indexing, Searching, and Theorizing) developed by Qualitative Solutions and Research Pty Ltd. of Victoria, Australia. This software should allow an in-depth analysis of the literature in these disciplines of study to search out examples pertinent to the research question and to show relationships and/or agreement. It is expected that this analysis will verify certain design practices or principles as they relate to desired behavior patterns in college and university settings.

QRS NUD*IST software for qualitative analysis will be used to cross reference the literature to identify patterns and connections between social behaviors and architectural design features. Those aspects of design that relate to college and university campuses will be isolated in the cells of the matrix.

Exemplars. Based on this analysis, an attempt will be made to find exemplars of these principles on college and university campuses. Exemplars will be identified through personal knowledge, references from the readings, recommendations from focus group discussions, and, if necessary, visits to regional campuses. It is hoped that some of this information can be published on the web and through conference presentations and that, through this exposure, other exemplars will be identified.

**Verification**

After the literature has been reviewed and analyzed, an effort will be made to verify the results as shown in the matrix. The results will be tested by using a focus group of designers and/or campus planners to compare the results of this analysis as shown in the web presentation of the matrix against what they have learned from practice and experience. The focus group analysis will confirm strengths and weaknesses of the product for more in-depth investigation and analysis.

A map of the proposed methodology follows:

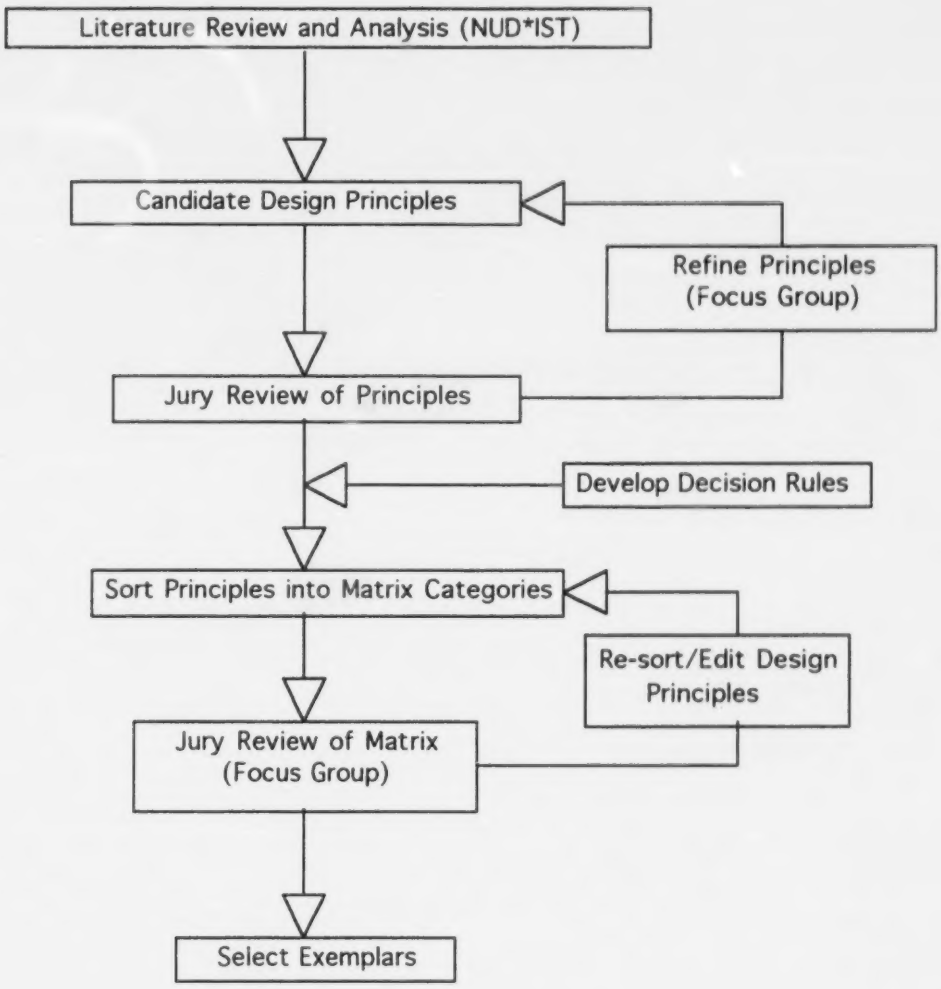


Figure 4. Map of Project Methodology

## CHAPTER FOUR
## SUMMARY OF RESULTS

### Preface

The following presentation summarizes the analysis of academic and professional writings concerning facility design and how design can promote or inhibit certain behaviors. The readings are diverse and by no means complete, but I believe they are representative of the literature that is available on the subject.

As noted in earlier chapters, there is some belief that university campuses should be structured like a village in order to promote the intellectual and social development of students. Based on village concept for a college campus, this analysis is a test of a model as well as an investigation of the relationships of certain design elements and personal behavior. The result is a matrix with architectural features on the x-axis, and a series of behaviors listed on the y-axis. The challenge of the project was to find research data addressing, for example, personal space and activity nodes (the intersection of the row and a column). Reports of research in social ecology or environmental psychology have not typically been written with these relationships identified. Even less seems to have been written regarding behavior design on university campuses, except for residents situations.

It became clear early in the analysis that "promenade" was not going to be a good example for this analysis. The concept is hardly mentioned anywhere but in Alexander's writings, and it did not appear that much research has been done (at least recently) on the concept. A decision was quickly made to replace "promenade" with a new category of "plazas, parks, and courtyards." This category includes features that are separated in Alexander's taxonomy, but for this application seemed appropriately combined since they are similar in many ways and all of these elements have been historically used in one way or another on university campuses.

The hierarchy of space (from largest to smallest; from most inclusive to more narrowly defined) in this discussion is as follows: Village (campus) ---> Neighborhood ---> District ---> Precinct.

Following Bechtel's (1997) definition, a district is any recognizable place in a city.

A condensed version of these results were posted on the internet at <http://www.d.umn.edu/~rkrumw/CampusDesign/> by cell number according to the matrix shown below.

| | | Architectural Design Features | | | | |
|---|---|---|---|---|---|---|
| | | Activity node | Neighborhood | Plazas, Parks, & Courtyards | Paths & Roads | Sacred Sites |
| Principles of Social Ecology | Distance | A1 | A2 | A3 | A4 | A5 |
| | Spatial Arrangement | B1 | B2 | B3 | B4 | B5 |
| | Amenities | C1 | C2 | C3 | C4 | C5 |
| | Congruency | D1 | D2 | D3 | D4 | D5 |
| | Personal Space | E1 | E2 | E3 | E4 | E5 |
| | Territoriality | F1 | F2 | F3 | F4 | F5 |

Figure 5. Matrix For Analysis of Data

Each cell of the matrix is posted with a link to design "guidelines" and a potential link to "examples" that will include photo demonstrations of the application or misapplication of the design recommendations. The guidelines link summarizes recommendations that reflect a combination of the two attributes connected at the intersecting cell, e.g. distance as applied to activity nodes is found in cell A1, spatial arrangement as applied to the layout of a neighborhood is found in B2, etc.

What follows is a full explanation of my conclusions for each of these interrelationships. It should be noted that only one cell in "congruency" has been completed and none of the "sacred sites" cells has

been completed. Explanations of these omissions will be given later in this section.

A1

Distance Between/Within Activity Nodes

Introduction

Activity nodes may be generically defined as focal points where paths meet and/or where people gather and interact with each other.

The standards for distance will vary slightly according to age, gender, and type of space.

It is important to distinguish between "physical/linear" distance and "functional" distance (Moos, 1976) and to view distance from the perspective of the user (Deasy, 1974).

Space types:

1. Campus space has been categorized by Sensbach (1991) as intimate, civic, and monumental.
2. Campus space types defined by Polyzoides (1997) include patio, courtyard, quadrangle, lawn or green, field.
3. Campus activity nodes might also be identified as office, social, classroom, study, and/or "commons" space.

Kevin Lynch (1971) suggests that shorter distances are "intimate" and the next longer relationship distance (<80 feet) is still "human."

Examples of distance recommendations

1. Intimate spaces: patio, <20 feet (Polyzoides, 1997); <80 feet across (Sensbach, 1991); 40-80 feet for human scale (Lynch, 1971); 64-80 feet (Marcus w/ Francis & Russell, 1990); courtyard, <100 feet on a side (Polyzoides, 1997).
2. Civic/courtyard spaces: <450 feet (Lynch, 1971; Sensbach, 1991); 230 feet x 330 feet (Marcus w/ Francis & Russell, 1990); <400 feet on a side (Polyzoides, 1997).
3. Monumental, or centralized public areas: <3500 feet (Sensbach, 1991); <3900 feet (Plas & Lewis, 1996).
4. Distance between activity nodes: approximately 300 feet (Alexander, 1987).

Factors affecting "functional" distances:

1. Visual connection and/or visual link with the destination site--centers of activity are more likely to be used if visible from the "originating" location.
2. How much the location/destination is desired--distances seem greater to places we like until familiarity with the route is established (Bechtel, 1997).
3. Whether other, closer sites will meet the identified needs--greater distances are acceptable if desired activities are uniquely met by a more distant site (i.e., recreation/social activity) (Moos, 1976).
4. How far an average person can walk in the time allowed (e.g. 900 feet in 4 minutes)
5. Number of environmental negatives (dust, noise, pollution, slope, type of walking surface, etc.) between the original and final destination (Marcus w/ Francis & Russell, 1990).

Activity nodes can be smaller than one might imagine; an area of 45 x 60 feet might be more than adequate to concentrate and encourage activity (Alexander et al, 1976; Alexander, 1987)

Parking should be available within 500 feet of a building (Alexander, 1987).

Summary Guideline Statement

Distances between activity nodes should be limited to functional distance as defined by the intended users/patrons of the nodes.

A2

Distances/Dimensions of the Neighborhood

Introduction

A university campus can be considered a "village" and within this village there will be neighborhoods identifying and defining groups residing there. How big should the neighborhood be?

It has been shown in a number of situations that the site plan, orientation and distance between doorways will affect behavior by fostering or discouraging passive, casual contacts between neighbors engaged in their normal tasks. Short distances and face-to-face orientation of entrances fostered social interaction in several housing studies (Moos, 1976). Campus neighborhoods should have the same considerations and work toward increasing casual contacts of users of the space.

When considering distance and spacing of activity nodes in a campus neighborhood, functional distance will be more important than linear distance. As noted in other examples of urban development, busy streets and features which interfere with travel and interfere with direct and efficient access to an area will significantly affect which constituents/residents will be involved in which areas of the campus, thus defining the boundaries of a neighborhood (Whyte, 1956; Jacobs, 1961; Deasy 1974; Moos, 1976; Rapport, 1977; Minami & Tanaka, 1995). See matrix cell A1 for more specific identification of factors affecting functional distance.

The greatest amount of social interaction will occur on campuses which have major pedestrian districts and which promote passive, casual contacts among those traversing the area. Distances for the neighborhood should correspond to what can be walked easily in a typical time period (e.g. the time break between classes). In urban design, a distance of three quarters of a mile has been used this is what normal business break times would allow (Plas & Lewis, 1996). Sensbach (1991) specified a "monumental" space as a distance of 3500 feet. These two distances seem to correspond, and assuming a casual walking speed of 2.5-3.0 mph, this amounts to a walking time of 15-20 minutes.



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The final size/dimensions of the campus neighborhood should therefore allow the majority of people to reach desired activity nodes within the time limits previously mentioned, or other time limits as determined by that group.

Design Recommendations

1. The longest distance should be limited to 3500 feet if the allowable walking time is 15-20 minutes.
2. This distance should be adjusted for barriers that may interfere with the movement from one node to another.

Summary Guideline Statement

The distance across, or size of, a campus neighborhood should be such that the majority of people can reach desired activity nodes within a community-accepted time period.

A3

## Distance and Dimensions of Plazas, Parks, and Courtyards

### Introduction

Plazas and courtyards can be destinations because of the activities that they promote or they can be part of the pedestrian system of the campus (Sensback, 1991). In either case, they can be very important in promoting casual encounters and providing opportunities for interactions that are so fundamental to feelings of comfort and affiliation with the institution and the people who work and study there.

Plazas and courtyards are considered together in this analysis because of the functions they serve and the interactions they promote. Mental images might vary, however distinctions can be made. Plazas are usually larger and more open than courtyards. Both plazas and parks are usually open to the environment, but courtyards may be enclosed and protected. Parks and plazas are very much alike, but Marcus (1990) makes the distinction that parks will have the majority of the area planted to grass and trees instead of being hard-surfaced.

In this analysis, plazas, parks, and courtyards will be a special type of activity node if they are a destination rather than a means of getting from one place or another. The difference is usually determined by the diversity of users and what exists in these plazas and courtyards to attract a diverse group of users. As in almost all successful urban spaces, the area is made "alive" and interesting by the diversity of users over extended periods of time (Jacobs, 1961; Chidister, 1986; Marcus, et al, 1990)

### Design Recommendations

When plazas and courtyards are considered to be a destination, the rules of design are the same as for other types of activity nodes with regard to size and separation distances.

Size. Rules on size of plazas and courtyards will be at the large end of the range for activity nodes. The narrowest dimension should be in the range of 45-70 feet (Alexander, 1977); Kevin Lynch (1971) said

that up to 80 feet is still "human" because at this distance, one can usually still see facial expressions. The maximum distance at the shortest dimension should not be more than 450 feet, based on observations of successful "town squares" (Lynch, 1971). Gehl (1987) suggested dimensions of 230 x 330 feet based on the ability to watch events. Alexander (1977) determined that the total area of a square should be 150-300 times the typical number of people to be using the square at any one time.

With these stated ranges in size and dimensions, it seems apparent that final size will be determined more by the anticipated users and/or the types of activities that are expected to occur in the area than by any tight rule of design. In this regard, then, there will be differences in the size and shape of what we visualize as a courtyards, plazas, or "green" space based on the types of activities likely to occur in the area ("intimate" versus "civic" scale--Sensback, 1991).

Almost every campus has some kind of central plaza or gathering place for meeting friends, listening to music, holding rallies, setting up displays, etc. The size of the central plaza varies; it should be large enough for large rallies, but it should not seem empty when unused (Marcus w/ Wischemann, 1990). The size of the central plaza varies; it should be large enough for large rallies, but it should not seem empty when unused. The subtle use of plantings and paving creates a space for large gatherings that does not appear empty or ambiguous at other times. (Marcus w/ Wischemann, 1990)

Separation Distance. The allowable separation distance between plazas, parks, and/or courtyards) will be determined to some extent by the attractions of the location since it is recognized that people will travel further to get to nodes with special features than to nodes that are not particularly unique (Moos, 1976).

As a general rule, plazas and/or courtyards should not be more than 300 feet from other activity nodes (Alexander, 1987) or some distance that can be reached in four minutes or less. Studies of downtown plazas in San Franciso and Sidney, Australia (Purcel & Thorne, n.d.), have shown that 900 ft (four minute walk) is about as far as people will walk, unless it is to "park-like," natural, or green space

(Marcus w/ Francis & Russell, 1990). Alexander (1977) recommended that there should be green space within 750 feet of any house in a district; while the context is different, there are similarities and connections in the environment and recommendations.

Summary Guideline Statement

Plazas and courtyards should be included in campus design, should be sized according to the anticipated intensity of use, and spaced close enough to other centers of activity to encourage people to use the space.

performances should allow students to sample the presentation before deciding to commit to attending.

6. To accommodate floating audience behavior, a meeting space should
   (a) be adjacent to a concentration of traffic,
   (b) be approachable from several sides,
   (c) should accommodate a group of 10 or 100 with equal ease,
   (d) allow students to arrange themselves vertically and horizontally (in a variety of seating positions).
7. Common spaces are located in space that is equally comfortable for all clients in the area.
8. Unions should be surrounded by places that generate a high amount of activity all day and into the evening.
9. Unions should be located with major pathways nearby providing a benchmark and a point of familiarity to large numbers of clients.

Study Space. Student study space should be designed with the following guidelines in mind (Sommer, 1969; Marcus w/ Wischemann, 1990):

1. The area should be partly enclosed or screened from major pedestrian flows using distance or barriers of some type;
2. the study space should be separated from other space by barriers, elevation differences, etc. to put boundaries on the space;
3. the space should be sized to accommodate one or two people (smaller tables instead of large ones).

Summary Guideline Statement:

The spatial arrangement of architectural features is perhaps one of the most important aspects of a campus if it is to provide client comfort and encourage client use of a campus area.

B2

## Spatial Arrangement of the Campus Neighborhood

### Introduction

The organization and layout of a campus is very important for it to function properly and for it to promote the intended social and intellectual atmosphere with those who visit, work, and learn there. Sommer (1969) indicated that all parties who have considered this issue agree that a school's physical plant should reflect its educational philosophy. Rapoport (1977) suggested that the characteristics of the built environment should/will reflect on the organization of communication of the campus, for example, American cities value maximum movement and accessibility while Moslem cities control behavior by limiting mobility. A campus that contains beautiful buildings but does not reflect an organizational plan or contain enclosed spaces or a village-like human scale seems uninviting, cold, and haphazard (Sensbach, 1991). Jane Jacobs (1961) and many urban planners have studied and analyzed why some parts of cities thrive and others die away and deteriorate. There are similarities in successful neighborhood and campus design.

Behavior settings are related to each other, and the most central behavior setting is the one where all the people of the town have the most contact with each other. Bechtel (1997) calls the most central behavior setting a "behavior focal point" because it is literally the focal point of behavior for the community. A "good" behavioral focal point has the following qualities: (1) centrally located with easy access for everyone; (2) is at a crossroads of traffic, specifically pedestrian traffic; (3) is behaviorally rich, with a mix of many different kinds of behaviors and people, (4) has maximum visual access so people can see and be seen; (5) has provision for lots of seating, very often with some kind of food and drink served. Put these qualities together and one has the primary framework on which to design a community. It provides a place where members of the community can meet face-to-face. (Bechtel, 1997, p. 242-244)

Design Recommendations

The following are some generalized recommendations for the spatial arrangements of campus neighborhoods:

1. Points of interest and/or centers of activity should be dispersed to encourage traffic and movement across/around the campus (Jacobs, 1961; Moos, 1976; Alexander, 1977, 1987).
2. Pedestrian districts should be maintained (Jacobs, 1961; Alexander, 1987; Sensbach, 1991; Polyzoides, 1997).
3. Parking should be limited and should support pedestrian access to districts, usually not to individual buildings (Jacobs, 1961; Deasy, 1974; Alexander, 1987; Polyzoides, 1997).
4. Each building should be placed in a position where, together with other existing buildings, it forms an exterior space which is beautifully dimensioned and shaped (Alexander, 1987).
5. To counteract the "campus sprawl" of recent years, campus development should be by "judicious infill" of existing spaces to produce a feeling of connection and "wholeness" (Alexander, 1987; Polyzoides, 1997).

For a campus to be safe and to encourage involvement and activity, it is important for the campus to have activity patterns based on high numbers of people active over a very large part of the day (based on node locations) and for a diversity of reasons. "The greater and more plentiful the range of all legitimate interest (in the strictly legal sense) that city streets and their enterprises can satisfy, the better for the streets and for the safety and civilization of the city." (Jacobs, 1961, p. 41)

Summary Guideline Statement

Active points of interest (activity nodes) should be systematically located to encourage pedestrian movement across and around the campus in high numbers and over an extended part of the day.

B3

## Spatial Arrangements in Plazas, Parks, and Courtyards

### Introduction

As a category of spaces, plazas, parks, and courtyards have common functions and common characteristics for success. All are important to a university campus because of the activities they stimulate and the general environment they provide for users. In very abbreviated fashion, distinctions between these three design elements are that plazas and parks tend to be larger than courtyards; plazas are mostly hard-surfaced while parks are mostly planted to grass and trees. Plazas and parks tend to be more open in their structure while courtyards tend to be more enclosed. (Alexander, 1977; Marcus w/ Francis & Russell, 1990)

In general, outdoor spaces that are "left over" between buildings will not be used by people. Jacobs (1961) stated that the greatest problem park areas are those located where people do not pass by and likely never will; Deasy (1974) noted in a student union study at California State-Los Angeles which showed that courtyards that are most heavily used are those next to major thoroughfares. Marcus with Wischemann (1990) noted the same results through several studies of city plazas and parks. Plazas, parks, and courtyards must be planned as part of the total campus master building plan and not be dealt with as an afterthought.

### Location

Outdoor spaces should be south-facing with the buildings positioned at the north end of the building space (Alexander, 1977). Buildings are necessary around plazas, parks, and courtyards, but they should be in the background, not in the foreground (Jacobs, 1961). Popular locations will be spaces that somehow are separated from buildings such that the space will not be claimed as a semiexclusive territory of any one department or group of students; the most successful locations are those that attract a variety of users (Jacobs, 1961; Chidister, 1986; Marcus w/ Francis, & Russell, 1990). Major circulation routes should be close by, but not pass through the area in

a way that interrupts or interferes with activities in the area (Marcus w/ Wischemann, 1990).

The location of the plaza or courtyard will determine how it will be used. If it is located at the junction of several pathways, it will be a meeting place, a place to watch passersby, and a place to pass through. A location between two major points of interest may become more of a pass-through area than an activity node. The most successful locations attract a diversity of users with a wide diversity of activities. People need reasons to use a space, e.g. eating, studying, social activity, rest/relaxation, etc.

A central plaza should be bounded by places that generate a high degree of use throughout the day and into the evening. A central plaza must be located where major pedestrian flows pass by so that many people become familiar with its pace, moods and seasons, and gradually "appropriate" the space cognitively. The central plaza can be an important sociopsychological and perceptual orienting device, thus pathways should naturally focus on it, bringing many people to the plaza. (Marcus w/ Wischemann, 1990)

A plaza or courtyard that is below grade needs a feature of some sort to announce the presence of the space and to encourage people to enter the space. Once people enter, they need a place to sit down. Features need to be larger as the distance below grade increases (Marcus w/ Francis & Russell, 1990)

Raised plazas and courtyards can also be successful if they are visible from the lower level. Again, plantings or features of some sort are necessary to announce its presence and to encourage people to enter the space (Marcus w/ Wischemann, 1990).

Shape

These public spaces should be shaped in ways that will accommodate through-traffic, allow people to have the degree of privacy they seek, and not be so large or shaped in such a way that people feel intimidated when alone or when only a few people are present. Alexander (1977) recommends that open spaces be shaped in such a way that a line connecting any two points falls within the space; areas that do not meet this criteria tend not to be used very much. Alexander and several

other researchers recommend that alcoves and subspace areas should be developed that look out into larger spaces. Spatial subdivisions should be evident, but subtle.

Public spaces should be arranged so that they cannot be easily dominated by an individual or group. Subspaces can be created by changes of level, plantings, seating, etc. that create a more pleasing visual appearance when the area is not filled up with people and encourages people to find an area to linger for a while. The broader the range of activities the area will accommodate, the greater the use of the area (Deasy, 1974; Alexander, 1977).

Studies of street plazas have shown that plazas flush/level with the sidewalk will be used by 30-60% of the pedestrians entering the block (Pushkarev and Zupan 1975). Observable changes in level are aesthetically pleasing and help define subspaces. To be used, however, the change in elevation should be modest so that visual contact can be maintained between areas. Functions of circulation and sitting are not incompatible, but they are distinct. Sitting and social activities need to be separated from pathways and located in subspaces of the plaza. Seating should be located within view of the pedestrian route through a plaza or courtyard (Marcus w/ Francis & Russell, 1990).

Design Recommendations

There are ways to encourage socializing in plazas, parks and courtyards:

1. Design a space for meeting other people that can be easily described to another person.
2. Design the park to permit regular groups of users to lay casual or temporary claim to certain areas.
3. Provide a relatively open layout to facilitate scanning the park for a friend or group.
4. Create a circulation system that leads people past potential social contact areas without forcing them to stop. (Marcus w/ Watsky, Insley, & Francis, 1990, p. 74).
5. Design the plazas, parks, and courtyards with subspaces and alcoves for privacy while still providing views to the larger spaces (Alexander, 1977, Marcus w/ Francis & Russell, 1990).

Summary Guideline Statement

Plazas, parks, and courtyards should be located near major pedestrian thoroughfares. These areas should be designed for a variety of activities to encourage people to stop and spend time in the area. The plaza or courtyard should not appear excessively large when there are few people present, but should contain subspaces that provide the desired amount of seclusion and personal comfort.

B4

## Spatial Arrangement of Paths and Roads

### Introduction

Placement of paths and roadways can be very important to the functioning of a campus. Failure to adequately plan and design these elements often leads to installing sidewalks over well-worn paths across green spaces, or creating severe vehicle-pedestrian conflicts which produce stress and great dissatisfaction with the environment and those who have anything to do with the design, management or operation of the campus environment.

Not only are paths and roadways critical for efficiently getting people from one place to another, they are important to the process of developing a sense of community with residents and in helping visitors find their way. Design and placement of roads and pathways is very important to the vitality of the campus.

Jane Jacobs and others have observed that contact is substantially affected by street layout. Superblocks and winding roads of suburban housing tracts limit the number of contacts that can be made because there are fewer channels for pedestrian travel and less opportunity for chance encounters. (Deasy, 1974, p. 36)

Map images are easiest to form where the street pattern is regular, with a single dominant path and where there are characteristic nodes and unique landmarks. Difficulties in orientation and low imageability can arise where the structure is clear, but the elements are too uniform to be distinguished or are not noticeably different (de Jonge, 1962; Rapoport, 1977).

### Design Recommendations

1. Establish clear pedestrian zones and maintain separation of pedestrian, motorized, and non-motorized vehicle traffic.
2. Crossroads must be clearly marked and traffic should be managed or controlled to minimize conflicts (Marcus w/ Wischemann, 1990; Markowitz & Estrella, 1998).
3. Sidewalks should be at a higher elevation than roadways (Alexander, 1977).

4. Lay out "short blocks" and/or have multiple pathways so that people have more opportunities to meet, mingle, and interact with each other (Jacobs, 1961).
5. Provide smooth transitions from primary to secondary roads/paths (Markowitz & Estrella, 1998)
6. Special roads (access) should be provided for service vehicles, away from pedestrian entrances (Marcus w/ Wischemann, 1990; Markowitz & Estrella, 1998).
7. Vehicle traffic should be limited and/or calmed (using raised crosswalks, chokers, etc.) in the campus core (Markowitz & Estrella, 1998).
8. Pathways should focus on bringing people to the central green/plaza as a sociopsychological orienting device, to encourage a common understanding of the pace and mood of the campus, and for people to gradually "appropriate" the space cognitively (Marcus w/ Wischemann, 1990; Plas & Lewis, 1996)
9. The nearest road should be extended to provide direct access to a building (Alexander, 1987).

Summary Design Statement

Roads and pathways should be designed for maximum flow, minimum interference, multiple routes, and a centralized focus of improving community interaction and affiliation.

C1

Amenities in Activity Nodes

Introduction

This category of analysis summarizes the scope of "social ecology" as it affects individual behavioral responses to the environment. It includes a variety of design elements which go beyond what is necessary to simply accomplish a physical or social objective. Ittelson (1960) described the environment as an ecological system with seven components: (1) perceptual, (2) expressive, (3) aesthetic values, (4) adaptive, (5) integrative, (6) instrumental, and (7) the general ecological interrelationship of these components. Rapoport (1977) described Ittelson's components as

(1) **Perceptual**--the ways in which individuals experience and interpret the world.

(2) **Expressive**--the effect of shapes, colors, textures, smells, sounds and symbolic meanings on people.

(3) The **aesthetic values** of the culture--how these values affect design and interpretations of architectural features.

(4) **Adaptive**--the extent to which the environment helps or hinders activities.

(5) **Integrative**--the kinds of social groupings which are facilitated or inhibited by the surroundings.

(6) **Instrumental**--the tools and facilities provided by the environment.

(7) The **general ecological interrelationship** of all these components. (Rapoport, 1977, p. 8)

The design process would be simplified greatly if "general ecological interrelationships" was not part of the analysis; this category adds a multiplier to all of the possible outcomes. The proper integration of amenities into environmental design is still, therefore, more of an art than the product of scientific analysis. Aesthetics in campus building is achieved by the accumulated effect of structural design, smart use of materials, wise choice of colors, distinguished methods of lighting, attractive landscaping, etc. This discussion will

attempt to summarize just a few of the elements most commonly considered in design for desired behavior responses.

Perception and Symbolism

As noted by Ittelson and Rapoport (above), individuals perceive things differently and perceptions may affect behavior nearly as much as the architectural feature. The most fundamental example of the effects of symbolism and our perception of features can be demonstrated through the example of how people have expectations of a restaurant, motel/hotel, etc. based on the appearances of the establishment (expensive or not, good food or not, etc.). Deasy (1974) noted that when no other information is available, decisions and judgements are made on the basis of what is seen. The ability to sense what is appropriate, based on clues or symbols that are virtually subliminal, can be very highly developed.

Rapoport (1977) pointed out that environmental effects are mediated by "filters": perceptions of the environment as well as expectations, motivations, judgements and symbolic meanings. The fact that people behave differently in different environments implies that the built environment provides cues for behavior through non-verbal communication. Thus the language must be understood. People act according to their reading of environmental cues; if the code is not shared, not understood, or inappropriate, the environment does not communicate. Because of cultural and individual differences, planning and "managing" an environment for a desired behavioral outcome can be extremely difficult.

Choices of form, materials, color, texture and detail should be made in terms of what these choices communicate to the user. The architect must find out what the forms, colors, textures and materials convey to the people who are expected to respond to these design elements. (Deasy, 1974)

Color

Color may affect peoples moods and levels of arousal (Mehrabian & Russell, 1974) as well as their attitudes. Blue is thought to induce feelings of security, red is thought to be stimulating or lead to excitement (Wexner, 1954; Veitch & Arkkelin, 1995). Studies have shown

that some colors raise blood pressure in students and some colors lower blood pressure. Warm colors (yellow based) can be used to stimulate activity, and cool colors (blue based) can be used to foster relaxation. A library with a cool color scheme was found to be significantly quieter than an identical library decorated with vivid warm colors (Hathaway, 1988).

Texture

In general, natural domains are characterized by irregular and curvilinear lines and edges, continuous gradation of shapes and color and irregular, rough textures (Barnhart, Perkins, & Fitzsimonds, 1998). It is known that plazas that are rated most highly have variety of form, color, and texture in landscape elements (trees, shrubs, fountains, and sculptures, variously-shaped artifacts, space articulations, nooks, corners, and changes in level) (Marcus w/ Francis & Russell, 1990). Textures add visual, and perhaps tactile, stimulation to users of the space. Textures should be used in areas designed for creative activities.

Lighting

Lighting is important not only for meeting functional requirements for those using the space but also for what light can add to the aesthetics of the space. Light and lighting patterns can add complexity and interest to space. Alexander (1987) recommends that building volume should be pierced by "holes" that are either gardens, or courtyards, or lightwells.

From a functional point of view, the following guidelines hold true:

(1) As illumination increases, visual acuity increases;
(2) the effects of changes in illumination are more pronounced on difficult tasks than easy tasks;
(3) greater illumination allows for more accurate and quick discrimination;
(4) at very high levels of illumination performance decrements are likely because additional light suppress some information cues.

The direction of the light can also produce glare or otherwise interfere will vision (Veitch & Arkkelin, 1995). Marans and Yan (1989) found that lighting was the second-rated factor related to satisfaction with the environment in offices (Size of the work surfaces was first).

Sommer (1969) cited some evidence that as illumination level increases the noise level in an area increases. At the time of his writing, however, most of the evidence was anecdotal and had not been verified.

Windows

Foregger (1997) surveyed the research data on the effect on performance and behavior of windowed and windowless rooms. The following is a list of points of special interest from this review:

(1) Retention of verbal material is not affected by the presence or absence of windows (J.Tognoli, 1973).

(2) There is little empirical evidence that working in rooms without windows negatively affects work performance (though people do not like working in rooms without windows) (Collins, 1975).

(3) Job performance does not appear to be affected by proximity to a window (Brill, 1984).

(4) Negative reactions to rooms without windows appear to be based more on the characteristics of the space than the absence of windows (Collins, 1976).

(5) Finnegan & Solomon (1981) found that while windowless employees were less positive about job satisfaction, interest value of job, and physical working conditions than windowed employees, work attitudes do not appear to differ significantly.

(6) Heerwagen and Orians (1986) found that occupants of windowless spaces used twice as many visual materials to decorate their offices as did those with window views, and the materials in windowless offices were dominated by nature scenes.

(7) Puleo, Hartleb, and Leslie (1991) concluded from their research that windows have a relatively minor influence on

productivity, mood and decision making, even though most people prefer windows in their workplace.

(8) Research on windowless/underground library buildings has been done by Kaiser(1984), Fraley and Anderson (1985), Rohlf (1986), Metcalf (1986), Foregger (1988), Holt (1989), and Edwards (1990) show no negative effects on staff or users and with advantages in lighting quality, heating efficiency, and space utilization noted in several responses.

(9) Windowless schools were investigated by McDonald and Burts (1961); H. Wright Architects' (1964); Karmel (1965); Karmel and Salt (1965); University of Michigan (1965); Nimnicht (1966); Platzker (1966); Brown and Hult (1967); Demos, Davis, and Zuwayliff (1967); Salt and Karmel (1967); Sommer (1969, 1974); Ochs (1971) and showed advantages in building economy, noise and heat isolation, and control of the instructional environment as advantages.

(10) Kuller and Lindsten (1992), however, noted that children in windowless classrooms showed a marked delay in the rise of cortisol levels which could delay the child's ability to concentrate and cooperate and could also impact body growth and sick leave.

Seating

Most discussion in the literature refers to the arrangement of seating rather than types of seating. With regard to types of seating, however, some recommendations can be made:

(1) Many types of seating should be available according to the intended users.

(2) Seating should be moveable rather than fixed in position; people want to move seating whether there is a need to or not.

(3) Seats without backs and sized for one or two people are very versatile in how they are used.

Water and Nature

The visual and aural attraction of moving water is universal (Alexander, 1977; Newell, 1997; Shahshahani, 1998). A noisy fountain

can be used to screen out surrounding traffic noises. One should also not underestimate the stress-reducing effect of the sound of falling water; in a dense urban setting a fountain should be as noisy as possible and as many seats as possible should be placed within earshot. A fountain must be in scale with its setting (Marcus w/ Francis, & Russell, 1990).

Design Recommendations

1. It is very important to understand how design elements will be interpreted by the users and what effect that interpretation will have on their behavior.
2. Color, texture, and lighting, as design elements, can be used to stimulate or calm users of the space.
3. While research findings indicate that windows are optional in design (no negative effects to a lack of windows), there is strong individual opinion that windows improve the working environment; the decision on the number and location of windows must be individually determined.
4. Water and natural views are a common "need" across cultures and should be included in design wherever these features can positively contribute to user satisfaction, contentment, and social development.

Summary Design Statement

Amenities must be integrated and matched to the specific user group in order to achieve a desired effect.

C2

Amenities in Campus Neighborhood

Introduction

While analyzing this category at the campus level, it became clear that various design elements are directly tied to the development of a sense of community on the campus. A primary objective of campus design and planning should be to encourage affiliation with the institution and promote interaction with other members of the community. To encourage feelings of affiliation and to promote interaction, it is necessary to design the campus so that its inhabitants feel comfortable and safe.

Unger and Wandersman (1985) have identified three components of sense of community: the social component, including emotional and instrumental support and social networks; the cognitive component, including (a) cognitive mapping of the physical environment and (b) symbolic communication; and the affective component, or the emotional attachment individuals have to persons living around them. Several researchers have tested the construct empirically in settings of various sizes ranging from small neighborhood blocks (Buckher, 1988; Chavis, Hogge, McMillan, & Wandersman, 1986; Chavis & Wandersman, 1990; Glynn, 1986; Prestby, Wandersman, Florin, Rich, & Chavis, 1990) to midsized foreign and domestic communities (Glynn, 1981) to large cities (Davidson & Cotter, 1986). Much of the earlier work focused on Unger and Wandersman's first and third components of sense of community, the social and the affective (Plas & Lewis, 1996).

Campus amenities relate directly to the cognitive component of the Unger and Wandersman model. Unger and Wandersman theorized that cognitive mapping of the physical layout of a neighborhood helps individuals determine the degree to which they feel safe in interacting with that particular environment. Attributes such as personalization of property provide symbolic communication to residents and strangers alike. Unger and Wandersman suggested that visual cues in the environment can be an important part of the development or hindrance of a sense of community (Plas & Lewis, 1996).

Wayfinding

Cognitive mapping is what makes it possible for people to navigate from "here" to "there". The process of navigating from "here" to "there" is known as "wayfinding." Wayfinding is encouraged and assisted by how we use color, textures, signs, symbols, lighting and other related elements of design.

Kevin Lynch's Image of the City (1960) was a seminal contribution to the study of cognitive mapping (Porteous, 1977). A city was said to be "legible" when its parts could be recognized and organized into a coherent pattern. Lynch stated that a person needed a cognitive map in order to find his/her way around a city and there were certain elements that people most often used: landmarks, paths, nodes, edges, and districts. Landmarks are easily recognized features that stand out and have an identity of their own. Paths are the routes people take to get places. Nodes are places where paths come together. Edges are definable physical things that serve to separate (streets, paths, railroad tracks, freeways). Districts are any recognizable places in the city or region (Chinatown, historical districts, tenderloins, the Bowery, etc.)(Bechtel, 1997).

The bulk of cognitive research in the environmental area has consisted largely of some aspect or other of Lynch's original thesis of the use of cognitive maps and the five elements, or cues, found in the urban environment (Bechtel, 1997). Golledge (1978) and Spector (1978) proposed the "anchor point hypothesis" that says that the person picks one of the cues (i.e. a landmark), and then organizes the other cues around it. Others confirmed the same finding--Coucelis, Golledge, Gale, and Tobler (1987); Wilton (1979) and Maki (1981) found similar results, but called it "clustering."

Cognitive mapping research continues, and this, and related, research has produced some guidelines for consideration in campus design:

1. Color-coded walls in corridors can help people find their way (Veitch & Arkkelin, 1995), but textures and patterns on walls or floors can also be used. Disorientation can be reduced by using different colors; non-repeating patterns in

walls, floors, ceilings; distinctive graphics; etc. (Lawton, 1974)

2. Simplicity in a floorplan is a strong predictor of wayfinding behavior (Bechtel, 1997).
3. Plenty of clear signage outside and inside buildings should be provided. Inside a hospital, people only traveled about 50 feet before feeling uneasy and looking for a sign to confirm their orientation (Carpman, Grant, and Simmons, 1984).
4. "You-are-here maps" work if the map is carefully aligned with the environment. If not in alignment, the effectiveness will be worse than without a map (Bechtel, 1997).
5. Streets and pathways should be clearly identifiable, should proceed to a goal, and should be organized in a visual hierarchy (Porteous, 1977).
6. The names of buildings should be clearly displayed and well lit after dark (Marcus w/ Francis & Russell, 1990).
7. The main entrance of buildings should be obvious (Marcus w/ Francis & Russell, 1990).
8. On entering a building that frequently has visitors, there should be immediate and obvious signs directing people to an information desk as well as signs to elevators, restrooms, telephones, and a cafeteria or coffee shop (Marcus w/ Francis & Russell, 1990).
9. Those leaving a building should see clear directional signs to public transit stops, taxi stands, and nearby streets (Marcus w/ Francis & Russell, 1990).
10. Linking buildings and interiors with the site (way finding) can promote a sense of community throughout the campus and afford people more control over their environment (Worthington, 1998).

Symbolism

Features often have significance because of their interpreted meaning. A lawn or green, for example, is a space dimensioned at the scale of the whole campus which can/does define its ritual and symbolic

center (Polyzoides, 1997). A clock tower, chapel, or carillon is often at the center of town or the center of a campus to focus attention in that direction and/or to make a symbolic connection with some aspect of campus tradition, heritage, or values.

Often, in architecture and as interpreted by much of our society, the height of a building reflects its status and/or importance. The tallest building on a campus can indirectly indicate to an observer what is considered most important or given more respect. Polyzoides (1997) has observed that "Monumental buildings" are unique in their symbolic importance, tend to accommodate shared programs important to the entire academic community, are prominently located, and tend to be the most physically and spatially idiosyncratic (Polyzoides, 1997).

Every aspect of a campus should be considered for the meanings it conveys to visitors and users. Are there any historical buildings on campus; what is their condition? What aspects of the campus reflect and communicate quality, wealth, creativity, values, etc.? Is there any artwork present on campus and what feelings and emotions are stimulated by the work? What flags are flying, where are they flying, and what ideas, values, or meanings do they convey? Is there any consistency or linkage in design between structures and/or between the inside and outside environments?

A study done by Christner, Inc. architects concluded that visitors tend to surmise that the institution's attention to such detail as a well-planned signage system is mirrored in other educational aspects, as well (Worthington, 1998). People will care for an environment if they see that management cares (with regard to graffiti, health of vegetation, litter containers, etc.). Good maintenance indicates to visitors that their use of the place is welcome (Marcus w/ Francis & Russell, 1990). Street lighting gives reassurance to people hesitant to use streets or pathways after dark (Jacobs, 1961)

Campus landscaping, plazas, and parks formally connect open spaces and adjacent buildings. They can define distinct settings for social interaction. By size, form, color, texture, scale, and other architectural characteristics, these design elements can strengthen the unity of the campus (Polyzoides, 1997).

Design Recommendations

1. Features should make connections between campus elements so that there is coherence to the environment which, in turn, creates an atmosphere of comfort and stability.
2. Campus design should have a basic organization or layout, inside and out, so that people can orient themselves to the campus easily.
3. Design elements of color, texture, light, spacing, orientation, nature, pathways, etc. should be used to create a coherent environment that supports and promotes a desired identity and image to non-campus residents.

Summary Design Statement

The amenities of a campus should "complete the picture" of a campus and convey messages to those who use and visit, while providing for user physical and spiritual needs; one must be sure that user needs are met and that the correct messages are conveyed.

C3

## Amenities in Plazas, Parks, and Courtyards

### Introduction

Plazas which have the highest user ratings have variety of form, color, and texture in landscape elements (trees, shrubs, fountains, and sculptures, variously-shaped artifacts, space articulations, nooks, corners, and changes in level). Moving to an environment of pleasing sensory/visual complexity can be a welcome relief and give an opportunity for people to contemplate and refocus (Marcus w/ Francis & Russell, 1990). For those using plazas and courtyards as pathways rather than destinations, Fruin (1971) noted that sensitivity and receptivity to sensory gradients, such as changes in color, light, ground slope, smells, sounds, and textures is increased when the pedestrian is assured of his/her orientation and direction.

With regard to guiding pedestrian flow, Pushkarev and Zupan (1975) observed that pedestrians tend to disregard color patterns on the walkway, whether the patterns are made by shades of brick or concrete, or painted lines. Pedestrians, however, do respect physical barriers and strong changes in texture. If the intention is to guide pedestrians in a certain direction, this message must be clearly conveyed in physical form through the location of walls, planters, bollards, or changes in level or texture (pedestrians avoid cobblestones, gravel, and ventilation gratings). Typically, though not always, a moving pedestrian flow will remain in the center of a space or flight of stairs, and sitters, watchers, and talkers will gravitate to the edges.

There are many types of amenities that can be discussed which promote favorable responses and encourage use of an areas, but water, plantings, seating, and food/vending are perhaps the ones most frequently mentioned that would apply to a campus environment. There may also be similarities between an urban environment and an American university campus in the use and effectiveness of sculptures and artwork.

Before discussing the amenities mentioned above, it should be emphasized that **good lighting** of plazas, parks, and courtyards is a

**necessity**, not simply a desirable amenity. The very things that often make plazas, parks, or courtyards attractive and pleasant places to be are the things that make the areas unsafe if not lighted in a way that encourages extended use. The challenge to planners and architects is to provide lighting in a skillful manner that provides safety while also, perhaps, creating another desirable setting for people to enjoy.

Water

Alexander (1977) identified flowing water as a "fundamental yearning" that people have (p. 136). The passage of water through a garden is considered very important; Brookes (1987) noted how water is an important part of gardens from southern Spain to India. Shahshahani (1998) stated that

> "not only does water reflect the sky, and in reflection evoke the idea of eternity, it also gives direction and centrality to a garden. Its sound in flow or in falling, in brooks, cascades or fountains, drowns out any surrounding noises. Thus it gives concentration to a reflective mind. (On-line)"

A fountain, or sculpture, that is highly visible and near well-traveled paths can promote contact and conversation (Crowhurst-Lennard and Lennard, 1987).

Plantings

The subtle use of plantings and paving creates a space for large gatherings that does not appear empty or ambiguous at other times (Marcus w/ Wischemann, 1990). The use of plazas and courtyards can be increased dramatically by using a planting plan that gives a variety of textural, color, massing, aural, and olfactory effects; Joardar and Neill (1978) found that people were attracted to plazas that offered visual variety and complexity, with trees, uncommon shrubs, and colorful annuals and perennials being especially important. It is important to have a variety plantings for visual interest, especially when people are alone, when they don't have a prop (lunch, book, or paper), and/or if there are few people to watch (Marcus w/ Francis & Russell, 1990).

The trees and shrubs may be of various colors. Annuals and perennials should be brightly colored. Fragrances should be considered

to be sure that the fragrances will be desirable (Marcus w/ Francis & Russell, 1990).

The eventual height and mass of plantings should not cut off the plaza user's view of an activity or performance area. If a plaza is sunken or below grade, trees should be planted in it that will soon grow above sidewalk level so that their foliage will add to a pleasing street experience, even if the plaza is rarely used except to pass through. The smaller (or more sunken) a plaza is, the more feathery-leaved, quasi-open trees should be selected so that users can see through them in different portions of the plaza. If one or more sides of the plaza are bounded by buildings that cannot be accessed from the plaza, the walls of these buildings can be screened by trees. Open, feathery species should be selected if the building needs to be screened but users of the building need light and views. (Marcus w/ Francis & Russell, 1990)

Seating

Seating should be provided in both prominent and less prominent positions. Structural security may be increased by placing outdoor seating or activity areas within view of major traffic (Lawton, 1974). For greenery to be enjoyed, there must be places to sit and/or lawns (sloped) should be positioned to be conducive to casual sitting. Plantings can satisfy the psychological need of many users to have an edge or island at their backs. Plantings should be protected from pedestrian damage; if there are not enough benches, steps, etc. for sitting, any horizontal surface will be used, including the narrow edges of planters (Marcus w/ Francis & Russell, 1990).

Many types of seating should be provided. Some seating should be designed for one or two people to use comfortably and with some privacy. Other seating can be made for groups of three or four. Benches and tables can be provided for people eating bag lunches or groups studying together. Comfortable seating should be located just to the side of the main pedestrian traffic entering the building (Marcus w/ Wischemann, 1990). Benches that are 3 feet x 3 feet or 3 feet x 6 feet, and backless seem to be the most versatile in terms of social groupings and

sight lines. Seat heights should conform to Architecture Graphic Standards (Marcus w/ Francis, & Russell, 1990).

Primary and secondary types of seating should be provided in a plaza, park, or courtyard. Secondary seating includes mounds of grass, steps (with a view), seating walls, and retaining walls that allow seating. Secondary seating should not amount to more than 50% of the total seating and should be between 16 and 30 inches high (Marcus w/ Francis & Russell, 1990). A mix of seating types helps the area look more inviting when there aren't many people present than if the space is filled with the same type of seating.

Because people universally tend to sit on the edges of spaces, rather than in the middle of them, the edges or boundaries of a plaza should, where possible, be planned for seating and viewing. A straight edge accommodates fewer uses than does an edge which has many "ins and outs." Steps and ledges are especially good for younger men, if the steps/ledges are wide enough; the more articulated the steps and ledges can be, the more likely they will be used for seating (Marcus, w/ Francis, & Russell, 1990).

Clusters of small seats providing orientational variety have been seen to attract a greater diversity of population and a wider mix of age, sex, posture or activity than typical linear configurations (Joardar and Neill 1978). There should be a variety of orientations with regard to views while seated, and variety in the amount of sun and shade provided (Marcus w/ Francis & Russell, 1990).

Seating should be made of material that does not respond much to temperature changes and does not damage clothes. Vandalism can be reduced by the type of material used and by designing and locating the plaza or courtyard so that there is continued use of the space and/or staff in the area during working hours (Marcus w/ Francis & Russell, 1990).

The number, or amount, of seating that should be provided has been defined in a number of ways. Miles, Cook, and Roberts (1978) recommended one linear foot of seating for each thirty square feet of plaza area. Whyte's study (1974) of sites in New York suggested that three linear feet of sitting space should be provided for every ten

people expected to use the area at any given time (peak plaza numbers x 3/10).

Food and Vending

Plazas and courtyards will be used more heavily if there is (inexpensive) food and/or vending nearby. The food and vending services act as an attraction for the plaza area and the plaza provides an area where the food can be consumed in more leisurely surroundings. Facilities (tables, seating, restrooms, telephones, drinking fountains, etc.) need to be provided for the consumption of food. If these amenities are not provided, people will move on to other locations or not use the area at all.

Litter containers need to be plentiful and frequently emptied to prevent a cluttered and trashy appearance that discourages people from using the area. The presence of numerous litter containers encourages their use, and frequent emptying maintains an atmosphere of supervision that reduces vandalism and addresses thoughtless "trashing" of the area (Marcus w/ Francis & Russell, 1990).

Sculptures and Artwork

Crowhurst-Lennard and Lennard (1987) suggested that sculptures and public artwork should be used to: (1) create a sense of joy, wonder, and delight, (2) stimulate play, creativity, and imagination, and (3) promote contact and communication by encouraging people to stop and strike up a conversation. In some situations, the feature can involve and interact with the audience in a way to further stimulate creativity and imagination.

It is strongly suggested, however, that all possible symbolism associated with the feature be anticipated to be certain that unwanted, subtle messages (those in conflict with the image and attitudes of the institution) are not conveyed by the sculpture or artwork.

Summary Guideline Statement

Plazas, parks and courtyards should be used to encourage and promote communication and personal interaction. The success of these architectural elements is dependent on, among other things, correct location, shape, and size, as well as amenities such as seating, natural

elements (water, trees, shrubs, and flowers), food, and sculptures or other artistic features.

C4

## Amenities as Related to Paths and Roadways

### Introduction

If a campus is going to take advantage of the opportunities for affiliation and interaction that paths and roadways can provide, some actions should be taken to be sure of their effectiveness in this function. Paths and roadways should be active, safe, and organized so that people can find their way. Various amenities associated with these features will help in this regard.

### Design Recommendations

1. Pathway surfaces should be selected according to preferred routes and/or wayfinding purpose. Texture is an effective tool used for guiding pedestrian flow (Marcus w/ Francis & Russell, 1990).
2. People avoid large-sized gravel and cobblestones (Marcus w/ Francis & Russell, 1990). These surfaces should be used for secondary or tertiary pathways.
3. Roads and pathways must be designed for full access such that these elements do not form barriers that inhibit interactions (due to age, mobility, etc.) of any members of the community with the full community (Marcus w/ Wischemann, 1990; Minami & Tanaka, 1995).
4. Benches should be placed along pathways to encourage people to stop and talk (Craig, 1998).
5. Some means of giving identity to paths and roadways should be provided that shows a clear pattern for orienting and wayfinding on the campus.
6. Paths should be established through and alongside natural areas, and especially along, or around, an expanse of water (Marcus w/ Watsky, Insley, & Francis, 1990).
7. "Street plazas" can add interest to a street or walkway because they are close to the street and there is lots of activity in the area.

Roads come after the building and not before. The correct sequence of consideration should be: pedestrians, buildings, roads (Alexander, 1987).

Venders

Streets must be used to be safe, but use cannot be forced. The following statements paraphrase Jane Jacobs' (1961) recommendations for streets as recommendations or guidelines for improving the activity and interaction on campus paths and walkways.

Substantial quantities of stores and other public places should be sprinkled along the sidewalks of a campus/district; enterprises and public places that are used by pedestrians during the evening and night must be among them. Interest in the area is increased by the venders and the variety of customers they attract; safety is increased by their presence. Venders function in different and complex ways to abet sidewalk safety:

(1) they give people reasons to use the sidewalks;

(2) they draw people along the sidewalks past places which have no attractions as routes to somewhere else; enterprises should be spaced frequently to populate stretches of street that lack public places along the sidewalk, and there should be a diversity of enterprises to give people reasons for crisscrossing paths;

(3) venders want peace and order and are great street watchers and sidewalk guardians (if present in sufficient numbers);

(4) the activity of people on errands is itself an attraction to other people.

People love to watch people and activity; people congregate where there is activity (students usually congregate at the busiest campus crossing).

Parking

Parking is the last item on the hierarchy of design or construction.

1. Parking should be shielded from campus view as much as possible by buildings or plantings (Alexander, 1987).

2. Parking should be available within 500 feet of a building (Alexander, 1987).
3. Building entrances should be visible and clearly identifiable from the parking areas (Alexander, 1987).
4. If parking space is limited, additional parking should be located on the edges of campus and shuttle systems used to transport people to and from the campus (Markowitz & Estrella, 1998).
5. It is better to over-build a parking garage than to under-build it; it will then be sized to handle future campus activity nodes (Alexander, 1987).

Summary Design Statement

Paths and roadways should be used to maximum advantage in an effort to encourage interaction and establish a connection to the institution while at the same time providing necessary parking and campus access.

D1

## Congruency in Activity Nodes

Introduction

The design of a space should match the behavior that is expected in that space. The design of a setting will discourage activities the are incongruent with the image or perception of the setting. Perception and image of a physical setting will be affected by age, experience, and cultural background.

People test reality against the images and evaluate environmental quality against the their ideals (Rapoport, 1977). The usefulness of a single set of planning and design standards thus seems doubtful. The definition of "comfort" varies as does the value attached to it. The same is true with the importance of privacy, view, sunlight, and the importance of space vs. equipment in dwellings (deLauwe 1967; Mitchell 1971)

Close physical and functional distance is congruent with the formation of friendships and incongruent with social isolation. Airport seating is not congruent with intimate conversation.

There might be a significant difference in the kinds of retreat places sought out by different campus age groups. When feeling low or depressed, adolescents tend to prefer a place of distraction (shopping mall, downtown, book-shop, active street), while most adults tend to prefer a place of contemplation (beach natural setting, quiet cafe) (Cooper Marcus 1989). This suggests that a setting like a campus with a fairly wide age-range of favorite places may need to span a range from active/urban to passive/natural in order to be congruent with user needs and expectations (Marcus w/ Wischemann, 1990).

When the environment is incongruent with their goals, expectations, values, or past experience, people tend to: (1) modify the environment, (2) change their mental image of the environment, (3) drop out (mentally), or (4) find a more suitable setting (Moos, 1976).

Design Recommendations

1. Distance, spatial arrangement, and amenities can make a setting more or less congruent with various kinds of behavior; the

physical setting needs to be congruent with the desired behavior.

2. Many types of activity nodes should be available to provide settings that are comfortable for the various inhabitants of a campus.
3. An alternative to creating activity areas that match desired behaviors is to provide space for groups to modify areas to accommodate accepted behaviors.

Summary Design Statement

Space must be designed for its users or space will be unused or, if used, used in ways not intended.

D2-D5

Congruency

After reviewing the literature on "congruency," I concluded that either there were several definitions of the term and how it is used to describe or define person-environment relationships or the term is more of a descriptor of an over-arching principle in architectural design. The over-arching principle basically says that the design of the environment must match the user--the architect must know the client and design to meet those needs!

Congruency of behavior with the environment is based on (1) personal values, (2) cultural norms, (3) past experiences, and (4) expectations or needs (Moos, 1976; Rapoport, 1977). As noted in cell D1, if the environment is not congruent, people will: (1) modify the environment, (2) change their mental image of the environment, (3) drop out (mentally), or (4) find a more suitable setting (Moos, 1976).

The literature reviewed in this study did not provide any data that fit into this matrix structure beyond what is given in D1. It appears that there has been significant investigation of "congruency" in the design of space, but it is very unclear as to how the results might apply to a university setting and as defined in the context of this matrix. More analysis will be necessary to make more recommendations, and it may be necessary to research specifically and strictly specified environments (college and university campuses) with strictly specified user groups. When there is specific research on behavior in university settings, more cells can be completed.

One of the reasons for considering congruency so strongly at the beginning of this investigation relates the issue of credibility of the institution. It was thought that perhaps more would be said of that aspect than I was able to find. Comfort and affiliation with a university will be maximized when good credibility is established with the institution. Good credibility is established when all of the messages of the institution agree--"What you see is what you get." Unfortunately, I cannot document anything more than a casual reference

to this aspect of congruency in the references and data reviewed thus far.

E1

Personal Space and Activity Node Factors

Introduction

Edward T. Hall (1959, 1966) observed "proxemics" and the concept of personal space as it relates to interpersonal, social distances of people. This has been studied very intensively by many researchers over the years, and while there are some differences in how it is defined, there is agreement that people react when interpersonal distance becomes too small or if the personal space is invaded undesirably. The response to an invasion of personal space is typically high stress levels and corresponding physical and/or psychological reactions (evasive or defensive).

Personal Space

Edward T Hall's influence on design and personal interaction awareness came from two books, The Silent Language (1959), and The Hidden Dimension (1966). As an anthropologist, Hall observed that different cultures make different uses of the sensory zones that surround the body: (1) intimate (touching to 18"), (2) personal (1.5 to 4 feet), (3) social (4-12 feet). The research was formalized in a handbook (Hall, 1974). Only at the personal and intimate distances could one use olfactory and temperature cues. (Bechtel, 1997, p. 79)

Many reviewers have had problems with defining personal space. As already noted above, Hall defined it in terms of visual, olfactory, and auditory cues. Sommer defined it in terms of distance, and most recent reviewers (Aiello, 1987; Hayduk, 1983) agree that the bubble concept (as used by Sommer) is misleading and unsupported by research (Bechtel, 1997). Interactive space is flexible, mutually adjustable, and situationally influenced (e.g., a rock music concert versus a street environment). The experience of encroachment on personal space is directly related to the kind of situation (Bechtel, 1997). Theater owners have observed that the social distance of crowds is different for different types of movies (Sommer, 1969). Sussman and Rosenfeld (1982) studied bilingual subjects and found that they spread apart when switching from Spanish to English and that they moved closer together

when switching from English to Spanish; this suggests that there is a choreography learned with a language (Bechtel, 1997).

There is variability in personal space according to culture, personality, race, age, sex, psychiatric disorders, type of interaction, social influence, ego state, environment, degree of affinity between interactors, and may also vary over time (Porteous, 1977). Strube and Werner (1983) say that distance is greater from others when one wishes to avoid control by others. Most researchers have treated interpersonal distance and personal space as almost synonymous. In a 1984 study, Strube and Werner described how people expand personal space toward the source of a threat (Bechtel, 1997).

Some general observations about personal space are:

- across almost all cultures, men have larger personal spaces than women, and women are more comfortable with closeness than men (Bechtel, 1997).
- in general, people learn the cultural norms for spatial behavior (Veitch & Arkkelin, 1995).
- Introverts will tend to stand further apart that extroverts.
- more confident, higher ego personalities have smaller areas of personal space.
- Klopfer (1969) found that during periods of increased stress, there is a greater need to define and defend personal space (Porteous, 1977).
- The experience of encroachment on personal space is directly related to the kind of situation. (Bechtel, 1997, p. 177-178)

Sommer and his research during the 1970's into library seating patterns became very well known and often cited. The clarity of Sommer's earlier studies on seating and seating arrangements seems to have slipped with time, but the distance factor has held up (Bechtel, 1997). Nonverbal privacy mechanisms include gestures, facial expressions, eye contact, body posture, body orientation, and fidgeting. Verbal and non-verbal cues tend to be in agreement, with verbal content seeming to be less important. Prolonged eye contact can communicate either intimacy or threat. The avoidance of eye contact is generally interpreted as communicating that the individual feels uncomfortable, or

would like to terminate the interaction; eye contact serves as a mechanism for symbolically decreasing or increasing interpersonal distance. (Veitch & Arkkelin, 1995)

Crowding

Crowding is a feeling experienced by a person when their personal space has been invaded. Arkkelin & Veitch (1978) noted that intrusion of one's personal space can be very annoying for one the intruded upon, and the typical reaction is one of flight. Where subjects decide not to flee they are often disturbed to the extent that they attempt to build barriers to the intrusion. The psychological experience of 'crowding' may be due more to invasions of personal space than to a response to the absolute number of people present (density). (Veitch & Arkkelin, 1995; Bechtel, 1997)

Predisposing attributes of crowding include: (1) culture; (2) prior experience--even within a culture, the tolerance for crowding varies according to early exposure to the situation; (3) motivation--how badly do the people want the situation to work. Crowding is a special kind of invasion that relates to density as defined by cultures (Bechtel, 1997).

The conditions of a setting can affect perceptions of crowding: (1) the setting and the movements of people can affect perceptions of crowding; (2) high density (number of people in a space) is an assumed feature of crowded settings; (3) physical constraints that interfere with the ability to perform tasks will give a perception of crowding; (4) how a setting is organized can influence perceptions of crowding. When the predisposing attributes that a person brings to the setting interact with the setting conditions, a complex situation arises in which all factors can interact to either alleviate or exacerbate the perception of crowding. Measures of density alone do not always produce the experience of crowding (Bechtel, 1997).

Males seem to be more sensitive to overcrowding than females. Males seem especially bothered in situations such as lines (Insel & Lindgren, 1978). Burch et al. (1978) found females are more anxious in crowded conditions than males, but Patterson et al. (1979) claims that this is because females react more to mixed-sex situations. "At this

time, we will have to be satisfied with the conclusion that some situations of crowding seem to affect men more than women while others affect women more than men. (Bechtel, 1997, p. 218)"

In a campus environment, Valins and Baum (1973) and Baum and Koman (1976) found that students who lived in suites rather than in rooms off long corridors had fewer perceptions of crowding. They also found that cooperative atmospheres produced fewer crowded perceptions while competition exacerbated the perception of crowding (Bechtel, 1997).

Social-affective (feeling) responses to crowding/density are related not only to density, but to the circumstances under which the density occurs. A number of studies have investigated the effects of density on social behaviors such as attraction, altruism, and aggression. Baum, Harpin, & Valins (1975), Baum & Valins (1977), Valins & Baum (1973) found that students living in socially dense dormitories were less talkative, less sociable, and less group-oriented than those from more sparsely populated settings. Gormley and Aiello (1982) compared crowding stress of students living in double vs. triple rooms, and reported that crowding stress and satisfaction with privacy were influenced by the number of people, and by the positivity-negativity of interpersonal relationships (Veitch & Arkkelin, 1995).

> Personal-space behavior ensures the adequate spacing out of individuals within the group. It thus operates to reduce stress and promote personal integrity, privacy, interpersonal communication, and group cohesion. . . . Environmental configurations clearly affect interpersonal behavior, including personal space. Especially in institutional and other public settings, the environments may be manipulated to promote or hinder either interpersonal communication or privacy-seeking behavior (sociopetal or sociofugal configurations). (Porteous, 1977, p. 58)

Summary Design Statement

Activity nodes must be designed to allow privacy and adequate space for personal interaction without producing feelings of stress through real or perceived crowding or other types of infringement of personal space.

E2

## Personal Space in the Campus Neighborhood

### Introduction

Extension of the "personal space" concept into the neighborhood setting is reflected most directly in discussions of crowding and community responses to high population densities and/or perceived crowding or spatial inadequacy. With over 200 studies done on crowding in the 1970's (Epstein, 1981), there are conflicting results. Part of the problem is the distinction between "social density" and "spatial density;" "social density" usually refers to the number of unwanted interactions with people and the number of uncontrollable interactions, and "spatial density" usually refers to too many people and/or too small a space (Bechtel, 1997).

Awareness of crowded or isolated conditions invokes psychological and physiological stress (Moos, 1976). Increasing spatial or social density has been shown to decrease performance on tasks that are complex and require a high rate of information processing (Bray, Kerr, & Atkin, 1978; Evans, 1979; Paulus, Annis, Seta, Schkade, & Matthews, 1976; Paulus & Matthews, 1980; Veitch & Arkkelin, 1995). Glassman, Burkhart, Grant, & Vallery (1978) and Karlin, Rosen, and Epstein (1979) showed that social density was related to grades attained in two separate university settings. It is thought that increased density overloads one's information-processing ability, resulting in impaired performance on tasks that require higher-level cognitive skills. According to Robert Sommer (1969), the normal response to overcrowding is "cocooning"--filtering out unwanted contacts by ignoring them; cocooning is not a desirable state, however, because it separates the person from reality.

Responses to stress can be moderated by: (1) the attitude of the individual as to how they perceive the source of the threat/stimulus (eg. Airport noise); (2) the perceived control the person has over the event or the results of the event; (3) the "hardiness" of the person (general level of physical fitness and psychological "learned hopefulness," commitment, and belief that one has control over one's

life), (4) social support (for help, comfort, encouragement, and/or self-disclosure); and (5) relaxation response (prayer, meditation, etc. to recuperate from stress) (Moos, 1976; Veitch & Arkkelin, 1995). Most researchers in the field have concluded that the physiological and health effects of increasing density are strongly influenced by the individual and by social coping mechanisms that people have learned to use in dealing with these situations (Veitch & Arkkelin, 1995).

Prolonged environmental stressors are likely to create an overload which results in the ignoring of social cues, failing to provide help when it is needed, and an indifference to the welfare of others (Bechtel, 1997). According to Craig (1998), the idea of engagement - conversation and collaboration - cannot be successful if the conversation does not occur. Even in the age of cyber-communication, face-to-face dialog is difficult to surpass for speed, content, and certainly nuance. If one doesn't have a supportive place, a place in which conversation can occur comfortably, meaningful exchange may be hampered or curtailed.

There might be a significant difference in the kinds of retreat places sought out by different campus age groups. When feeling low or depressed, adolescents tended to cite a place of distraction (shopping mall, downtown, book-shop, active street), while most adults tended to cite a place of contemplation (beach natural setting, quiet cafe) (Cooper Marcus 1989). This suggests that a setting like a campus with a fairly wide age-range, favorite places may need to span a range from active/urban to passive/natural (Marcus w/ Wischemann, 1990).

Design Recommendations

Campus design should consider how occupants can manage/control personal space and unwanted interruptions and/or invasions of personal space. There must be opportunities for faculty, staff, and students to find locations where they have some assurance that their privacy will not be invaded (Deasy, 1974). To do this, there must be some understanding of the background and culture of the occupants to know what will, and will not, be acceptable. A diverse population will require diversity in the campus design. Private spaces can be designed

A4

## Distances with Regard to Paths and Roads

### Introduction

Paths and roads are the arteries of the campus neighborhood, and unless spaced and sized properly, flow will be restricted and/or shunted in other directions. While there might be a tendency to install sidewalks after paths are established by users, it is usually better to anticipate flow patterns with the possibility of encouraging use of, and directing people to, a desired area.

Free-flowing conversations and meaningful exchanges often take place in more casual circumstances. Opportunities to talk, to follow a line of inquiry, can and do occur in passing, on the way from one place to another. That is why campus pathways should be wide, to encourage those actively engaged in conversation to see and hear what each other has to say-to walk side-by-side, to address each other fully. (Craig, 1998).

### Design Recommendations

1. For pleasure walking, walkways should be sized for a minimum of two people per minute per foot of width (Pushkarev & Zupan, 1975); transit operating agencies might size for 25-27 people per minute per foot of width (Cooper Marcus w/ Francis & Russell, 1990).
2. Lively, popular sidewalks should be wider. Jacobs (1961) suggested a width of 30-35 feet for a city setting.
3. As the size of the campus (city) gets bigger, more roadway per commuter needs to be provided (Lamm, 1973; Bechtel, 1997).
5. Sidewalks must be wide enough to handle peak flow rates (Marcus w/ Wischemann, 1990)
6. Increase sidewalk width around vending locations and primary entrances to buildings.

Summary Guideline Statement

It is very important to size paths and roads according to the anticipated flow rates, recognizing that as areas become popular, they will have higher flow rates. As in many other design situations, it will be less costly to oversize than to undersize the space if the option is available.

B1

## Spatial Arrangement of Activity Nodes

### Introduction

> Space is experienced as the three-dimensional extension of the world which is around us -- the intervals, relationships and distances between people and people, people and things, and things and things, and space is at the heart of the built environment. Spatial organization is, in fact, a more fundamental aspect of the designed environment than shape, materials and the like. (Rapoport, 1977, p. 9)

Activity nodes must draw together the main paths of the surrounding community. Activity nodes usually develop and occur at the intersections of pathways; these nodes might occur because of the placement of the pathways or the pathways can develop because of the placement of the activity nodes. There should be some symbiotic relationship (with regard to the times and reasons that people go there) of the facilities surrounding a node. Facilities around a node must attract the same kinds of people at the same times of day (Jacobs, 1961; Alexander, 1977)

It is not sufficient to have the proper, required elements for a desired activity; the arrangement of the elements will significantly affect the effectiveness of these elements in achieving the desired results. People are inherently gregarious in their nature (Deasy, 1974), and a failure to provide adequately for the urge to gather can be a major failure in a campus or building design. Lounge space is not a luxury or fringe benefit if the campus hopes to encourage staff and students to communicate and share ideas. At the same time, designers/architects must remember that social contact is seldom limited to areas that are formally designed for these purposes (Deasy, 1974).

There are two factors that affect chances of meeting and the degree of satisfaction from meetings: **proximity** and **configuration**. Failure to satisfy client needs in this regard are particularly

noticeable not only in lounges, lobbies and conference rooms, but also in areas where meetings are not consciously part of the behavior pattern (Deasy, 1974).

Proximity

Festinger, Schachter, and Back (Social Pressures in Informal Groups, 1950) concluded that "friendships will depend upon the occurrence of passive contacts and the patterns and frequency of passive contacts among particular people will depend upon the ecological factors of physical and functional distance." People with common values and interests must be able to find each other (Gutman, 1972; Deasy, 1974; Moos, 1976). Planners must identify and take advantage of spaces where people with common interests and values pass through or congregate in order to encourage interpersonal contacts. Spaces of this type include, but are not limited to hallways/corridors and classroom/building entrances.

Hallways/Corridors. Lawton (1974) found that corridors in hospitals and retirement homes served an important social function, especially close to entrances. It is suggested that alcoves and seating areas be provided for clients/residents to gather while staying out of the flow of traffic (Porteous, 1977). This would also be true of areas outside classrooms to accommodate students waiting for, and leaving class (Craig, 1998). Hallways should be wide to allow groups to walk and converse easily without interfering with passers-by.

Classroom/Building Entrances. It is helpful if a lobby is located in the area around a major entrance to a building where most of the traffic will pass to enter the building (Porteous, 1977). The "lobby" can be inside or outside of the building depending on the dominant climate conditions of the area. Outside lobby areas have been called the "front porch" or "front yard" of buildings by Marcus with Wischemann (1990) and can follow the same rules as inside gathering spaces with regard to amenities and configurations to make them suitable for waiting, meeting, casual conversation, etc. (Lawton, 1974).

The primary entrance of a building should be clearly identified, located at a natural traffic point, and be sized for anticipated traffic loads in order to encourage continued use of the entrance and its

amenities for interaction that can be provided in that area (Lawton, 1974; Alexander, 1987; Marcus w/ Wischemann, 1990).

Configuration

Seating. Furniture arrangement and overall design of the spaces affect behavior. "Sociofugal environments" (e.g. railway stations, hotels, mental hospitals) discourage social contacts and the formation of interpersonal relationships; "**sociopetal** environments" (e.g. tepees, igloos, small seminar rooms) encourage contacts and development of interpersonal relationships (Moos, 1976). Organizations can encourage either small group effectiveness or communication within large departments by appropriately altering spatial seating arrangements.(Moos, 1976)

Seating that is in a line does not encourage interpersonal conversation, whereas curvilinear or concave seating does encourage conversation.

- Social spaces are usually near entrances or oriented toward local resources that have interest or aesthetic value (Lawton, 1974).

Lounge, Meeting, or Gathering Areas. When conversing or cooperating, people tend to sit across from (but close to) each other or adjacent (or at an angle) to each other to maintain/have eye contact (Sommer, 1969; Porteous, 1977). Clusters of small seats providing orientational variety have been seen to attract a greater diversity of population and a wider mix of age, sex, posture or activity than typical linear configurations (Joardar and Neill, 1978).

In an investigation of group size, John James and his students (1951) observed that 71% of all groups, both informal and work groups, contain only 2 people, 21% contained 3 people, 6% contained four, and 2% contained five or more individuals. This data suggests strongly that seating in lounges, and areas with tables, should be designed to accommodate, primarily, groups of 2-3 people (Sommer, 1969). Even in structured meetings, groups will tend to be of 5 or less (Deasy, 1974).

- When space is limited, furniture which readily adapts to different group sizes will be preferred to furniture which somehow limits group size options.



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Classrooms. Classroom configurations convey messages of style and openness to those in the room. According to Rudolf Moos (1976), a classroom with the chairs in rows and the teacher's station in the center-front of the room conveys the message that learning is "teacher-centered." A square classroom with the teaching station in the corner and moveable chairs tends to indicate that learning is active and involved. Circular seating patterns tend to indicate peer-learning. And classrooms with activity and resource centers tend to indicate that searching and investigative learning takes place in the room.

Seating patterns directly relate to participation levels in class. In a seminar situation, students next to the instructor rarely participate while those opposite participate the most; without a leader/instructor, participation is usually freer and more balanced, and follows the Steinzor Effect in which the person next to speak will be the person sitting opposite the last speaker (Porteous, 1977).

F.S. Sumley and S. W. Calhoon learned in their research that the distance between the instructor and the student was a significant factor in children's ability to remember; putting children closer to the teacher will improve performance (remembering word groups). Similar results were observed in college situations--distance between the instructor and the student significantly influenced the student's class participation, even when students were seated alphabetically. (Deasy, 1974, p. 51-52)

Student Unions. Some guidelines for student union and commons space are summarized in the following points (Deasy, 1974, Marcus w/ Wischemann, 1990):

1. Outdoor eating areas are more heavily used if food is served directly in the area.
2. Courtyards are more heavily used if located next to main campus thoroughfares.
3. Spaces should be arranged so they cannot be easily dominated by a person or group.
4. Common spaces should allow a maximum range of behavior options ranging from seclusion to group activities.
5. Meeting rooms for speakers, presentations, and/or

in a manner that either clearly states this purpose or allows a user of the space to give non-verbal cues to this intent.

Summary Design Statement

The campus environment should be diverse and should provide opportunities for people to find the kind and amount of separation from interruptions and invasions of personal space that they desire.

E3

## Personal Space in Plazas, Parks, and Courtyards

### Introduction

The discussion of personal space as it relates to plazas, parks, and courtyards will not be much, if any, different from what has been presented with regard to activity nodes or neighborhoods. People need space and security from unwanted invasion of personal space. Review cells E1 and E2 for an inclusive list of recommendations that may apply to these situations.

### Design Recommendations

1. Design plazas, parks, and courtyards with subspaces and alcoves for privacy while still providing views to the larger spaces (Alexander, 1977, Marcus w/ Francis & Russell, 1990).
2. Features should be provided which allow people to have their backs protected while relaxing in a plaza or courtyard.
3. Seating should be provided in both prominent and less prominent positions.
4. Many types of seating should be available to control and protect sitting space from intrusions by strangers.
5. Some seating should be moveable to allow flexibility in degrees of separation and isolation from neighboring activities.
6. Provide a barrier or define a boundary around study and other "private spaces."

### Summary Guideline Statement

Plazas, parks, and courtyards should provide opportunities for people to control their personal space and protect themselves from unwanted interruptions and intrusions of their personal space.

E4

## Personal Space on Paths and Roads

### Introduction

The most reasonable that the connections between personal space and paths and roads are made with respect to personal feelings of crowding and for personal safety. These are the issues most commonly referenced with regard to paths, sidewalks, and streets.

Jane Jacobs (1961) spoke in great detail about how "street life" and the "street neighborhood" is so important in developing a sense of community. Other researchers have come to many of the same conclusions. Most of the following observations and recommendations come from those perspectives and discussions.

A well-used city street is likely to be a safe street. If a city street is to be equipped to handle strangers and to be safe, it must have three main qualities: (1) there must be clear demarcation between what is public space and what is private space; (2) there must be eyes upon the street, eyes belonging to those we might call the natural proprietors of the street--the buildings on the street must be oriented toward the street; and (3) the sidewalk must have users on it fairly continuously--large numbers of people entertain themselves, off and on, by watching street activity. In smaller settlements, controls on acceptable public behavior seems more controlled through a web of reputation, gossip, approval, disapproval and sanctions, etc. than by direct observation (Jacobs, 1961, p. 34-35).

### Design Recommendations

1. Streets and pathways must be wide enough to handle the number of people who want to use it at any given time without causing a situation of actual or perceived crowding that raises the stress levels of those using the space.
2. It is perhaps desirable to have constant traffic on a pathway, over an extended period of time, rather than peak periods of flow; attractions and amenities should be considered that will stimulate desired flow patterns.

3. "Pull offs" can be used to allow people to step out of the traffic flow to have a conversation without forcing them to continue with the flow of pedestrian traffic while conversing.
4. Look for ways to encourage consistency and regularity to traffic flows so that faces are familiar, a sense of community develops, and people feel responsible for taking care of one another.

Summary Guideline Statement

Paths and roadways must be used to be safe, but not used at such a high rate, or configured in a way, that it causes feelings of crowding and stress for those traveling on the paths and roadways.

F1

Territoriality in Activity Nodes

Introduction

"Territoriality" and "dominance" are behaviors commonly found in animals and demonstrated in many ways with humans. Some authorities argue that both territoriality and dominant behavior are ways of maintaining a social order, and when one system cannot function, the other takes over (Sommer, 1969). Territoriality is most often demonstrated by the consistent use of particular beds, chairs, table areas, etc. such that a sense of ownership is felt by the occupant and accepted by observers. Territories can be: (1) stationary or moving, (2) permanent or temporary, (3) individual or collective (Porteous, 1977).

A territory is a geographic space, separate from personal space, that exists even when owners are not present (Lyman & Scott, 1972; Bechtel, 1997). A territory is often, not always, marked by boundaries that are discernable (Bechtel, 1997). Sommer (1969) listed four types of territories in human societies: public, home, interactional, and body. Public territories included courtyards and parks where there is freedom of access but not necessarily of action. Home territories are public areas taken over by groups or individuals (clubhouses, bars/coffeehouses). Interactional territories are where social gatherings might occur; they have clearly marked boundaries and rules of access and egress. Personal territories are the space around one's body which is most private and belonging to the individual. Personal territory, however, does not fit the definition given above.

Lyman and Scott (1972) defined home territories as areas where the regular participants have a relative freedom of behavior and a sense of intimacy and control over the area. Home areas may be easily confused with public space except as the area is defined by regular use by specific persons or categories of persons and by "territorial stakes" or "identity pegs" (reserved chairs, drinking mugs, signs, memorabilia, etc.). Home territories can also be established by "sponsorship" or "colonization" when a person or group lays claim to a formally free

territory. Minami and Tanaka (1995) refer to a home territory as a "group-specific behavior setting" and suggest that it is a category of place where people conform to a particular set of implicit norms concerning the nature of the place ("what this place is for") and behavioral rules ("what you can do and you cannot do here") associated with the place. Such settings can be meaningful only for the user groups or "insiders."

Altman (1975) defined three types of human territories: primary, secondary, and public. Primary territories are those over which one has most control, such as one's own house; usually owned or with a sense of ownership. Secondary territories are those that are more public but occupied exclusively for a time. Public territories are those one temporarily occupies such as a park or a table in a restaurant. Finally, Porteous (1977) defined territory types, based on ethological principles, as (a) microspace--personal space, (b) mesospace--home base, (c) macrospace--home range

Territories are usually personalized, or marked, in some way so that others can know who claims the space. Personalization can be reflected in the pictures, a name plate, and other objects or decorations (Veitch & Arkkelin, 1995; Bechtel, 1997). Territorial control provides security and/or privacy, stimulation, and identity (Porteous, 1977).

> The research conducted on territorial markers indicates that a variety of territorial markers serve to protect one's spot in public areas, with personal effects being more effective than nonpersonal items when the area is crowded. In primary territories, the presence of clear territorial markers enhances the perception that the area uniquely belongs to the owner, and serves as a signal to potential intruders that the area is "off limits," thereby preventing unwanted intrusions. However, the effectiveness of "defensible space" depends on the social and physical context of territorial markers. (Veitch & Arkkelin, 1995, p. 263)

Territories will usually be defended if a stranger intrudes (Lyman & Scott, 1972; Deasy, 1974; Porteous, 1977; Ley & Cybriwsky, 1974;

Veitch & Arkkelin, 1995). Privacy is clearly important to daily functioning, and much territorial behavior is aimed at protecting that privacy (Altman, 1975; Veitch & Arkkelin, 1995). Privacy protects people from excessive contact; no matter how well one might get along, there is a threshold beyond which interaction is unendurable for both parties (Schwartz, 1972). Privacy both reflects and helps maintain the status divisions of a group; the ability to invade privacy is also reflective of status (Schwartz, 1972; Lang, 1974).

Gradations of social control and assertions of "group privacy" over places by a particular group can be depicted as differentiation among private, semiprivate, and public space of the group. In a social environment, there are places where a certain group can explicitly or implicitly assert their right to maintain dominant occupation and privacy (a private segment of social space), moderate occupation (semiprivate), and no legitimate occupation (public space). Differentiation of social space in this respect provides another dimension of regulative processes between groups and physical environments (Minami & Tanaka, 1995).

Territories can serve important functions. A number of researchers have reported that clearly defined demarcations of what is "ours" and "theirs" can serve to reduce hostility and aggression, thereby facilitating harmonious interpersonal relations (e.g., Ley & Cybriwsky, 1974; Mack, 1954; Marine, 1966; O'Neal & McDonald, 1976; Veitch & Arkkelin, 1995).

Some people are more attached to place than others, and there are places to which people become attached more easily than others. Calm streets generate a sense of belonging, while streets with heavy traffic undermine this sense of belonging by constraining space appropriation. Personal territories are likely to be settings where the configuration of physical and social stimuli are within the optimal range preferred by the individual. Establishing a territory gives people control over their lives, in terms of regulating when and with whom they interact (Veitch & Arkkelin, 1995).

Oscar Newman studied how planning of housing projects (New York) influenced the level of criminal activity within the projects. Where a

small number of families shared a common entrance and the units were so designed that it was possible for them to see what was happening in "their" mutually shared public space, a sense of territoriality developed that proved to be a surprisingly effective defense against criminal activity. Tenants reacted to the presence of suspicious strangers and felt no reluctance to call the police if some threat seemed to be developing (Deasy, 1974). A sense of territoriality comes with exposure, familiarity, and a feeling of affiliation and ownership that is important in school spirit and retention.

Design Recommendations

To the extent that group identity and affiliation is encouraged, campus space can be designed to either encourage or discourage territoriality:

1. Social groups tend to be fewer than 12 people (Deasy, 1974), so gathering spaces should be sized accordingly.
2. Public spaces should be arranged so as to discourage domination by an individual or group (Deasy, 1974).
3. Radical changes in the physical environment will force re-orientation, renegotiation, and redefinition of group space (Minami & Tanaka, 1995).
4. Personalization of the space, within acceptable limits, should be allowed where group space is encouraged, but personalized space will be defended (Porteous, 1977).
5. Identity and privacy are very important and space should be provided which allows this, but if interaction and diversity is to be encouraged, locations and relationships of group spaces should be carefully analyzed and planned.
6. Establishment of territories can be used to mediate dominance by other groups.

Summary Guideline Statement

Group space should be provided to encourage connection and affiliation with others of similar interests and with the institution.

F2

Territoriality on Campus

Introduction

Territoriality on campuses coincides and/or relates to the development of a "sense of place" on the part of those who live and work there. "When an individual experiences "fit" with a place, he or she experiences "sense of place"--an atmosphere that promotes interaction and comfort and uplifts the spirit (Worthington, 1998, p. 35)." As members of the university community become more familiar and established in the environment, they will define areas where they feel most at home and most comfortable--areas that they consider "home turf" based on the familiarity of the people who frequent the area (Marcus w/ Wischemann, 1990). Neighborhoods are the preferred territories of humans (Lee 1968, 1978; Bechtel, 1997)

Territoriality exists on the individual and collective level. The features and characteristics of this behavior that exist at the individual and activity node level will also exist at the neighborhood level. In particular, it will be noted that there will usually be identification and personalization of some campus areas and boundaries may be defined. Home base, or home turf, areas provide the territorial satisfactions of security, identity, and stimulation. The neighbor relationship occurs because of proximity; it is not prescribed or chosen (Porteous, 1977).

Altman (1975) described three kinds of territories that humans differentiate: (1) primary--exclusive to the occupant, relatively permanent, under total control of the owner; (2) secondary--some perceived ownership, but rights not exclusive to the occupant; and (3) public--areas of free access that everyone has equal right to, usually determined on a first-come-first-serve basis, with ownership rights very limited and temporary. (Veitch & Arkkelin, 1995, p. 260-261)

"Neighborhood" refers to home base at the collective level. The idea of neighborliness involves the maintenance of a healthy balance between two activities; privacy-seeking and respect for the privacy of others is matched by mutual support, especially in times of stress.

Neighborliness implies an actor or role (the neighbor), an activity (neighboring), and a geographic space (neighborhood) (Porteous, 1977).

McMillan and Chavis (1986) suggested that their working definition of sense of community applies equally to places and people and that in territorial communities, it is nonetheless the nature of human interactions within those boundaries that creates a sense of community; in other words, the people make the place. Plas and Lewis (1996) suggest that it is possible for the place to make the people. The environmental context induces a shared emotional connection and feeling of belonging that McMillan and Chavis highlight in sense of community. Plas and Lewis conclude that there is a relationship between variables that may define sense of community (membership, need fulfillment, shared emotional connections, loyalty) and the environmental variables of town design, architecture, and urban planning philosophy. A sense of community is very important for retention and long-term affiliation of students with a college or university, so efforts must be made to cultivate, support, and/or encourage "fit" and a "sense of place" for faculty, staff, and students (Worthington, 1998).

Districts within the campus neighborhoods can be described and identified in many ways including residence, science, arts, athletic, administrative, professional school, and student life districts/areas. Other types of campus districts, commonly referenced include "fraternity row", "the quad", "the mall", "the union"; when these labels are used, images and expectations usually come immediately to mind.

Design Recommendations

The key elements of home territory are personalization and identity, privacy, and a connection or familiarity with other people in the area. Campus architecture should support, and encourage, these elements.

1. Signage should identify areas of the campus. Not only can this improve wayfinding effectiveness, it endorses affiliation and establishes connections for people in the area.
2. Some forms of personalization should be encouraged (pictures, trophy/display cases, unique features/artwork/landscaping, etc.) while maintaining the overall image of the institution.

3. Lounge, rest, social, study, and/or other activity areas should be provided to encourage interactions of those working, visiting, and passing through the neighborhood.

"Place-making, artfully applied, will over time forge a coherent campus image and enhance perceptions of the institution." (Worthington, 1998, p. 35)

Summary Guideline Statement

Territories are necessary for personal comfort and to reduce stress but locations should be carefully considered for the proper blend of isolation and integration of the campus population.

F3

## Territoriality in Plazas, Parks and Courtyards

### Introduction

Plazas, parks and courtyards easily demonstrate the effects of territoriality. Some territorial behaviors are blatant and others are more subtle. In non-university environments, different groups, especially with regard to age and sex, will handle plaza, park, and courtyard space differently.

There are some significant gender differences in how men and women use plazas, parks and courtyards. Men tend to dominate open spaces (Dornbusch & Gelb, 1977), and in most urban settings, men will prefer the front locations of plazas and courtyards, close to the traffic and/or the main entrance. Men generally consider (downtown, public) plazas as a place for human interaction and are more tolerant than women of interruptions and intrusions (Marcus w/ Francis & Russell, 1990).

Women, on the other hand, will most often use a plaza in pairs, one of a couple, or in small groups and will go to an alcove or the back of the plaza where they have more privacy and control over their space (Minami & Tanaka, 1995). If food is served in the area, these patterns are a not as consistent (Marcus w/ Francis & Russell, 1990).

Women generally do not like being on display and will therefore look for ways of avoiding this situation (Mozingo, 1984). Plazas and courtyards need multiple entrances and configurations with subspaces that give seclusion and privacy as desired.

It has been noted on several campuses that minority groups often seek out and claim a highly-visible seating area on the main plaza of a campus, presumably for daily meetings with friends (Marcus w/ Wischemann, 1990). To the extent that territoriality is desired, plazas, parks, and courtyards can be designed to either promote or inhibit acts of territoriality.

Whyte concluded that the most used plazas are the ones that are most sociable (Marcus w/ Francis & Russell, 1990), so plaza, park and courtyard design should focus on providing the necessary social space for the desired users. The Project for Public Spaces (1978) and

research by Marcus (1975-1988) showed that the more heavily a plaza is used, the greater will be the variety of user's ages and the more evenly the sexes will be balanced (Marcus w/ Francis & Russell, 1990).

Generally speaking, territoriality should be discouraged in public spaces such as university plazas, parks, and courtyards because it is a wasteful use of space (Deasy, 1974), and it inhibits interactions of the diverse populations that should be encouraged to use the space (Veitch & Arkkelin, 1995). As Jacobs and others have pointed out for so long, the vitality of community space is strengthened by diversity of activities and a diversity of populations using the space. Public territories should have freedom of access, but not of action (Sommer, 1969; Lyman & Scott, 1972; Altman, 1975)

Design Recommendations

Territoriality can be temporary or long-term; architectural design of space can promote or inhibit either or both of these. The particular challenge in designing plazas, parks, and courtyards is to balance the need for privacy with the need to discourage territoriality. In the design of plazas, parks, and courtyards, territorial behaviors can be discouraged by:

1. including alcoves and subspaces which satisfy the need for privacy for groups of 2-5 people;
2. designing small changes in elevation or levels in the plaza to help define areas while maintaining visual contact with the whole area;
3. designing the area in such a way that a person or group cannot dominate the space and affect other users of the space by limiting access or controlling activities (conversation, study, etc.) in some way;
4. locating the plaza, park, or courtyard at some distance away, or in an area, that cannot be considered for the exclusive or semiexclusive use of a particular group;
5. using visual and/or subliminal cues in the design of the plaza space to define appropriate behavior for the area--the symbolism of the built form influences where people feel most comfortable and the types of social contacts that are likely to

be made there (Deasy, 1974);

6. locating the central plaza on "common turf" where the occupants of all buildings or precincts can feel equally comfortable (Marcus w/ Wischemann, 1990).

Summary Guideline Statement

Plazas, parks, and courtyards can serve their greatest purposes of providing opportunities for people to interact on a casual basis when they would not ordinarily do so and by providing opportunities for people to break away from their tasks and refocus; designs should inhibit efforts to establish territories in commons areas, but to systematically establish outside territories where it might be more appropriate.

F4

## Territoriality with Regard to Paths and Roads

### Introduction

There is some question about how "territoriality" relates to the design of paths and roads, but it seems that a relationship might be made in the concepts of "home territory" and "home range". Lyman and Scott (1972) identified a "home territory" as an area with (1) freedom of behavior and (2) a sense of control and intimacy. It is an area of familiarity, comfort, and affiliation.

Porteous (1977) used the term "home range" to define degrees of affiliation and protection. Home range is defined as the area beyond a home base (home territory) which is not to be defended but is an area traversed to satisfy hunger and other drives. Home range is viewed as a series of activity nodes interconnected by paths. It has no effective boundary.

The key elements of this concept are "control and intimacy." Feelings of control and intimacy lead to involvement and sharing. Paths and roads/streets may extend the areas where people are recognized, and therefore establish a familiarity and connection with the environment and other people using the environment. It should also be noted that in studies of school children (Minami & Tanaka, 1995), intergroup transactions occurred at the outskirts of semiprivate space (home territory). Therefore paths and roadways can facilitate intergroup transactions (interactions) by being identified as "neutral" territory.

### Summary Guideline Statement

Paths and roads should function as neutral, or common, territory for personal and group interaction by means of the amenities and the arrangement of the pathways and nodes.

A5-F5

Sacred Sites

This was another situation where personal experience on college and university campuses suggested that sacred sites would be a major component of the design and development of a campus, and again, very little research was found on the topic. What was found fundamentally acknowledged that these sites exist, that they are part of the culture, heritage, and development of villages and cities, and that decisions have been made to preserve these sites. Writings referring directly to university settings also stated this. It appeared, however, that such sites are not necessarily part of the planning and development of a campus, but that they are recognized over time as having this status and are then given the protection afforded to sacred places. Beyond the recognition, these sites may be further developed and given more attention in future development of the area, again over some period of time after they are recognized. As Christopher Alexander, et al. in A Pattern Language (1977) stated (as a rule to be followed):

> Whether sacred sites are large or small, whether they are at the center of the towns, in neighborhoods, or in the deepest countryside, establish ordinances which will protect them absolutely--so that our roots in the visible surroundings cannot be violated. (Alexander, 1977, p. 133)

As in the case of "congruency", the sacred sites category will need to be analyzed further to determine whether this feature should remain as part of the matrix, and if so, how can it be defined in any terms other than how other cells have already been defined in the matrix?

## CHAPTER FIVE

## SUMMARY CONCLUSIONS AND RECOMMENDATIONS

### Review of Methodology

The plan as mapped out in chapter three was the framework and plan that was followed in the development of this grounded theory investigation. The methodology given in chapter three proved to be workable except in some ways which made the process more difficult and cumbersome but should not have affected the integrity of the results.

Literature Review. In the literature review, it was observed at an early stage that writing on the subject seemed to be concentrated in the period of the late 1960's until the mid to late 1970's. It was very difficult to find anything written about the subject after that time. It was not until late in the process that an article by Robert Sommer (1996) and a book by Robert Bechtel (1997) explained the situation. These two researchers, who were pioneers in this field, explained that there was great interest in this field of study during the 1960's and 1970's but many of the young researchers soon found that this research was not generally accepted or given as much credibility as research in the more traditional areas of their home disciplines for tenure decisions. As a result, the young researchers refocused their efforts to writing for the traditional disciplines. In some cases the focus of the research changed, and in other cases, the writing was done in the traditional disciplines and it became more difficult to find the information. There now appears to be a resurgence of interest in the topic, and many of the traditional academic disciplines have subdisciplines on the subject, e.g., Social Ecology, Environmental Psychology, Environmental Sociology, Community Psychology, etc.

QSR NUD*IST. In the review of the data, it was intended that QSR NUD*IST would be the vehicle used to simplify and speed up the process of analyzing the data. Unfortunately, the technicalities of the software made it extremely difficult, and practically impossible to use the software effectively. In addition, a lack of familiarity with this research process prevented efforts to simplify or remedy the situation. After adopting a manual method of sorting and analyzing the data, it

became more evident that there was probably an error in the original copy of the software which caused the sorting difficulties that were observed.

In retrospect at this stage of the analysis, it would be suggested that NUD*IST, or a similar software program, should be used to give greater freedom and flexibility in analyzing the data. During the manual review and sorting process, it was necessary on several occasions to edit or re-sort data in a different manner. Tracking the citations that were the basis of conclusions also became more and more difficult. With the amount of information involved in this project, it was very difficult to keep thoughts and concepts in the proper order and relationship.

Jury Review of Principles. A review of the matrix and early results of this analysis took place at the 1999 North Central Regional Conference of the Society for College and University Planning (SCUP) held on the campus of the University of Michigan in Ann Arbor, Michigan, USA, on April 9 & 10, 1999. There were ninety-eight registered attendees at this meeting, and a presentation about this analysis and preliminary findings was made to approximately half of the group (an exact count was not taken). A review of the registration list indicates that the audience was about evenly divided between practicing architects and college and university facility planners.

The response to the presentation was very positive and supportive. Some of those in attendance had worked with researchers cited in the presentation. One architect had been a faculty member when this field of study was so popular and had attempted to use some of the environmental design principles proposed during the 60's, 70's, and early-80's. Ten of those in attendance asked for copies of the presentation materials and were tallied on a list, and copies were also given to people whose names were not put on the list. Several others asked to see information when it was further developed. It was also noticed that terminology used in this presentation, and which isn't normally used in these discussions, was used in presentations of the second day of the conference. The feedback and response of conference participants strongly supported and verified the direction and

appropriateness of this investigation. Cues and suggestions received at the conference were considered in the continued investigation.

Sorting Data into the Matrix. The literature was carefully reviewed and elements of the readings were coded, and re-coded, according to the architectural or social ecology principles on the axes of the matrix. Separate lists of literature references and conclusions were generated for all eleven topic areas of the matrix. In the initial sort, there was no real concern about duplication of information in more than one category because there was some interest in knowing, at least in general terms, how broadly the data might fit into the matrix.

The lists from the initial sort of data were then re-sorted according to the individual cells of the matrix. Information sorted for each of the social ecology categories was redistributed to each of the architectural features categories. Data from each of the architectural features categories was matched and distributed to each of the social ecology categories. Each new list was then a combined summary for each cell of the matrix, e.g., distance and activity node. Duplicate entries were removed at this point in the process, and the results were analyzed and organized for compilation and review by an impartial group of practitioners and/or researchers.

Jury Review of the Matrix. The review process consisted of placing the results of this investigation on a web site and soliciting feedback. The matrix which was the basis of the analysis was expanded (Appendix A) and placed on an internet site

**http://www.d.umn.edu/~rkrumw/CampusDesign/**

with web links to the data for each cell. The address of this site was distributed via email to the sixty-eight of the attendees of the April SCUP conference. The group solicited for review feedback was composed of architects, facility planners, and university administrators.

The site address was distributed via email along with a short survey (Appendix B) with open-ended questions to solicit feedback on the results of analysis and the web presentation of the information. Those solicited were asked to respond by replying to the email, downloading the survey form and attaching the completed form to a return email, or by printing the form and returning it to me by postal delivery. In

order to maintain anonymity of those receiving the survey I used the "bcc" option in the email package to address the email message. The first email attempt failed to reach everyone on the list, so the list was broken into smaller groups and again distributed, and this process seemed to work. Through the process of correcting email addresses and by the fact that those on the "bcc" list were not included on my copy of the email, there is no way to totally verify who received the survey. Some respondents indicated that they forwarded the survey to someone else in their organization. I can only know that I attempted to distribute the web site information and survey broadly for evaluation feedback, and only those on the SCUP registration list who had incorrect/discontinued web addresses, or who were conference visitors with unrelated job positions were dropped from my email distribution.

Exemplars. This aspect of the project will not be completed for this dissertation. Some analysis of other campuses has been made and photos have been taken, but much more time, effort, and support will be necessary to make this part of the web site effective. To be done correctly, a review panel should be used to select examples that will best demonstrate how features can promote the desired campus behaviors. Several examples can be shown in each cell, but it will be important that the exemplars be clear and concise, and that they truly represent the recommended guidelines.

**Results**

The first concern of this investigation was whether there was research and published information that would apply to college and university campuses. At this point in the investigation, it is clear that there is historical as well as current, on-going research that can be applied to these questions. There also appears to be a resurgence of interest in person-environment relationships as well as a desire to better understand the social and psychological aspects of "community building." This research, coupled with new ways of (electronic) publishing and much broader access to knowledge, suggests that information should be more plentiful and accessible in the future.

The second early concern in this project was whether the matrix

organization of data was (1) feasible and (2) beneficial. There is positive affirmation on both aspects of this concern. As the data were analyzed, the categories were very beneficial in deciding why something might be done and/or what behavioral effect a feature might have. The format also helped explain some architectural design principles more clearly than found in the literature. Most earlier writings focused on specific features and gave a review of the effects on behavior; few, if any, earlier writings made any connection between a human or social need, or a behavior characteristic, and how this need/behavior might be addressed by a feature or design principle.

Architectural Design Features. The architectural features identified for this analysis seemed to work well from the standpoint of being well-defined and appropriate. Alexander's work in defining a taxonomy for design was a major advantage. The only liberty taken in this analysis was the combining "plaza," "park," and "courtyard" and combining "paths" and "roads" from Alexander's list. For the purposes of verifying the effectiveness of the matrix analysis, the liberty seems well-taken. The differences in these categories were not perceived as significant when applied to a campus environment.

As noted in the chapter four, the "sacred sites" category needs more study as to whether it is appropriate in this matrix or if it should be handled in another way. It does not seem appropriate to remove the category from the matrix because it is a element identified in almost all campus designs and seems to be a personal need that people have. It is less certain at this time, however, as to how/when this design element should be included or considered in campus planning.

Social Ecology Principles. The social ecology categories chosen for this investigation raised questions in this analysis process. The social and psychological aspects of person-environment interactions are much less well defined in the literature; a taxonomy similar to what Alexander defined in architecture does not seem to exist in the fields of social ecology or environmental psychology.

The three categories of "distance," "spatial arrangement," and "amenities," for example, were referenced by several researchers, including Moos, Sommer, and Rapoport, with specific examples of how

people usually respond to changes in these aspects of the environment. While Alexander's taxonomy did not include any of these three categories, these categories seem more design-based than person-based. When reviewing the literature referencing these categories, it was necessary to intensively try to make the connection between social/psychological needs and design guidelines that would address those needs in a campus environment.

In comparison, the social ecology categories of "congruency," "personal space," and "territoriality" are clearly person-based concepts. Design recommendations for these categories came from a slightly different decision framework and mental frame of reference than the first three categories. It seems that, with regard to distance, arrangement, and amenities, the question was "how do these fundamental design elements affect human behavior in each matrix environment?" while with congruency, personal space, and territoriality, the question came from the perspective of "how does design promote or inhibit these behaviors?" These questions are disconcerting in ways that suggest that a third dimension to this matrix might be necessary. The overall results in this matrix are not in question, but there was a difference in how these categories were approached in the literature and how information was placed in the matrix.

Continued Research and Analysis. In an effort to better assess the need and direction of further research, Figure 6 shows an analysis of "confidence level" for each of the matrix cells with "1" meaning low confidence and "5" meaning a high level of confidence in the relationships identified and the design recommendations that have been made. Confidence ratings in the cells reflect a personal appraisal, in a general context, of confidence in the results of this study with regard to the accuracy and appropriateness of the data and recommendations.

| Confidence Level | | Architectural Design Features | | | | |
|---|---|---|---|---|---|---|
| | | Activity Node | Neighborhood | Plazas, Parks, & Courtyards | Paths & Roads | Sacred Sites |
| Principles of Social Ecology | Distance | A1<br>4 | A2<br>4 | A3<br>4 | A4<br>4 | A5<br>xxx |
| | Spatial Arrangement | B1<br>5 | B2<br>4 | B3<br>5 | B4<br>4 | B5<br>xxx |
| | Amenities | C1<br>4 | C2<br>4 | C3<br>4 | C4<br>4 | C5<br>xxx |
| | Congruency | D1<br>3 | D2<br>xxx | D3<br>xxx | D4<br>xxx | D5<br>xxx |
| | Personal Space | E1<br>4 | E2<br>4 | E3<br>4 | E4<br>4 | E5<br>xxx |
| | Territoriality | F1<br>4 | F2<br>3 | F3<br>4 | F4<br>2 | F5<br>xxx |

Figure 6. Level of Confidence Level in Cell Content

Confidence Level. As figure 6 indicates, there is good-to-strong confidence in what has been presented. Feedback thus far, though very limited, gives support to the content and organization of the matrix. Architects who have reviewed the information have supported the content, and conversations with architects regarding campus planning have highlighted and supported many of the guidelines summarized in the matrix. The use of the matrix to sort the volumes of research data greatly simplifies presentation and understanding of the information.

Areas of greatest concern, as mentioned in chapter four are the cells relating to congruency and sacred places. When pursuing this further, "congruency" must be analyzed with respect to messages conveyed by architecture and campus design. The messages conveyed must be the messages intended and must be consistent. Consistency in the messages

is fundamental to agreement and common understanding of the values of, and commitments between, the institution and the faculty, staff, and students who live, work, and study at the institution. It is for these reasons that congruency is important in this analysis and should be pursued.

"Sacred places" must also be analyzed and described for this matrix. Such places are a consistent part of college campuses (stated openly, or simply "understood"). As noted in chapter four, this might be a situation in which sacred places are not really planned or designed into a campus, but that such spaces are recognized and protected once they are established. Even in situations where sacred spaces develop over time, it is expected that some guidelines should be stated to recognize and protect the sacred space of a campus. Again, this is an area for further investigation.

The next most important areas for further investigation center on "territoriality" and the relationship of this concept to the features of "neighborhoods" and "paths and roads." In each of these situations, the concern is not so much about the accuracy and/or validity of the statements made so far, as it is with concern for what more can be done and should be said about these relationships. In the situation of territoriality and neighborhood relationships, more should be known and said about how to allow and promote feelings of territoriality where it is appropriate and advantageous. With regard to paths and roads, the concern and objective should be to maintain these spaces as neutral territory in order to promote group interaction.

Potential for Future Development. As the confidence ratings were being determined for Figure 6, a related question came to mind that focused on the potential for additional analysis and further development of design principles for each of the cells in the matrix. Figure 7 gives ratings for potential future development and application, using the same scale as in figure 6. Ratings for these cells were based on (1) the perception that additional research and/or data could strengthen the content of the matrix cells and/or (2) the perceived potential for more clearly defining the environmental behavior relationships and design principles for cells of the matrix.

| Potential for Additional Analysis & Development | | Architectural Design Features | | | | |
|---|---|---|---|---|---|---|
| | | Activity Node | Neighborhood | Plazas, Parks, & Courtyards | Paths & Roads | Sacred Sites |
| Principles of Social Ecology | Distance | A1<br>3 | A2<br>3 | A3<br>2 | A4<br>3 | A5<br>xxx |
| | Spatial Arrangement | B1<br>4 | B2<br>3 | B3<br>2 | B4<br>3 | B5<br>xxx |
| | Amenities | C1<br>5 | C2<br>5 | C3<br>3 | C4<br>4 | C5<br>xxx |
| | Congruency | D1<br>4 | D2<br>xxx | D3<br>xxx | D4<br>xxx | D5<br>xxx |
| | Personal Space | E1<br>3 | E2<br>5 | E3<br>4 | E4<br>3 | E5<br>xxx |
| | Territoriality | F1<br>4 | F2<br>5 | F3<br>4 | F4<br>3 | F5<br>xxx |

Figure 7. Potential for Future Cell Development

In reviewing the results of this analysis, the greatest potential rests in the cells with ratings of "4" or above. Again, these ratings reflect a judgement that there is more that can be done with these cells; the ratings do not indicate that the present content of these cells is invalid. Cell B1 is alone in that row with a rating of "4" to indicate that more can be known and should be defined. This cell is important and should be developed further because activity nodes are the fundamental elements of a community, and the spatial arrangement within a node is fundamental to much of the success of an activity node. This cell, and the matrix, can benefit from additional emphasis and development.

The cells in the "amenities" row have high ratings largely because the concept is so broad and comprehensive that this investigation has

only started a list of design recommendations and behavior relationships. Attempts were made in various cells to raise elements for awareness and attention, but the presentation was not nearly as comprehensive as it can be for each of these categories.

Finally, the concepts of "personal space" and "territoriality" offer potential for future development and clarification. Personal space is fundamental to feelings of comfort and low stress which, in turn, promote more interpersonal interaction. Territoriality is basic to feelings of belonging, protection, and allegiance which are important in retaining students and having alumni with a willingness to support and further develop the institution. Both of these concepts are important and, with further investigation, can be expanded beyond their present state.

**Future Applications**

The greatest use of this matrix in the future may not be so much with architects, but more with campus administrators and campus planners (who may not come from an architectural background). Conversations with some architects about this investigation have indicated that many/most architects have had training and/or experience which validates recommendations made in this matrix analysis. The matrix, however, summarizes concepts for the architects and also provides an organization for better understanding of the concepts by those less familiar with campus design and elements of design affecting behavior of people visiting and working in this environment. This information will be distributed to a variety of possible users to verify its usefulness.

The capital investment in campus facilities is so large (initial investments and annual operating costs) that knowledge of how to derive the greatest benefit from these investments is critical to the financial stability as well as the academic and social effectiveness of institutional efforts. It is anticipated that this matrix will be very useful to anyone in administration or otherwise involved with campus planning. This matrix will help prioritize renovation and construction projects. It should also help administrators interact more effectively

with planners and architects to reach conclusions that meet the overall goals and objectives of the institution.

**Recommendations For Future Action**

The first action step beyond what has been done so far involves further review of the matrix by architects, campus planners, and other user groups to verify content, collect recommendations for improvements, and to collect exemplars of how these design principles can be applied. Some of this will be done by expanding the web presentation of the data, further distributing information about the web site, and monitoring use and feedback on the site. Efforts will also be made to present this information at technical meetings for information and to solicit comments and feedback.

Presentations and personal contacts will be used to identify possible exemplars which will be reviewed and placed on the web site. Exemplars will be very important in developing a common understanding of the design principles that are presented in the matrix. Only by trying to apply the principles will the effectiveness of the matrix be confirmed and flaws in the process be identified.

In the review process, the categories of the matrix analysis must be reviewed and also verified. Concerns about the fields of the matrix have already been noted in this chapter, and it will be important to resolve these concerns as quickly as possible. Information needs to be studied and/or definitions need to be clarified in order to define design principles appropriate for these matrix cells. If the cells can not be completed, the matrix should be redefined.

The final recommendation at this time is that consideration should be given to how the matrix can be expanded and/or refined. There are other design elements in Alexander's taxonomy that are appropriate for college and university settings. Aside from any possible modification of social ecology principles, there may be additional principles of social ecology that should be developed. There is a renewed interest in the United States in social ecology, environmental psychology, urban development, community development, geography, etc. that can all add to this model and further improve the effectiveness of campus planning.

Appropriate research findings in these fields should be integrated into this model to produce a concise and centralized summary of information for those involved with campus facility development.

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**APPENDIX A**
**WEB MATRIX**

| | | Architectural Design Features | | | | |
|---|---|---|---|---|---|---|
| | | Activity Node | Neighbor-hood | Plazas, Parks, & Courtyards | Paths & Roads | Sacred Sites |
| Princi-ples of Social Ecology | Distance | A1 Guideline Examples | A2 Guideline Examples | A3 Guideline Examples | A4 Guideline Examples | A5 Guideline Examples |
| | Spatial Arrange-ment | B1 Guideline Examples | B2 Guideline Examples | B3 Guideline Examples | B4 Guideline Examples | B5 Guideline Examples |
| | Amenities | C1 Guideline Examples | C2 Guideline Examples | C3 Guideline Examples | C4 Guideline Examples | C5 Guideline Examples |
| | Congruen-cy | D1 Guideline Examples | D2 Guideline Examples | D3 Guideline Examples | D4 Guideline Examples | D5 Guideline Examples |
| | Personal Space | E1 Guideline Examples | E2 Guideline Examples | E3 Guideline Examples | E4 Guideline Examples | E5 Guideline Examples |
| | Territori ality | F1 Guideline Examples | F2 Guideline Examples | F3 Guideline Examples | F4 Guideline Examples | F5 Guideline Examples |

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**APPENDIX B**
**WEB SURVEY**

Dear Colleague:

I tried sending this yesterday, but it appears that it went somewhere into cyberspace. Some people evidently received the message, but an unknown number did not. If this is a duplicate, please accept my apologies and trash this message.

This is a follow-up on my presentation at the North Central Regional Conference of SCUP last April 9-10, and I am asking for your assistance in reviewing the work that I have recently completed with regard to campus design. I have tried to identify and list ways that architectural design features might promote desired campus behaviors. My objective was/is to compile information and present it in a way that will help people design and renovate campuses in ways that will (1) promote interpersonal interactions of faculty, staff and students, (2) will promote feelings of affiliation with the institution, and/or (3) will improve the safety and comfort of those who visit/study/work on college campuses.

The results of this study are located at a web site <http://www.d.umn.edu/~rkrumw/CampusDesign/>. I am asking you to look at this web site and then complete a brief questionnaire that I have copied below and attached as Word and WordPerfect documents (2). I have kept the questionnaire very short and open-ended so that you can easily decide how detailed you want to be in responding. Any and all responses will be greatly appreciated.

I am giving you the questionnaire in three formats so that you can respond by: (1) replying to this message, (2) attaching, or copying, a completed form to a reply message, and/or (3) by mailing a paper copy back to me separately. I hope that by providing the form in these ways, you can easily use a method of responding that works best for you.

The web site has a matrix with links to the results of my analysis. If you are interested in knowing about the relationship between distance and activity nodes, click on "Guidelines" in cell A1. The relationship between distance and neighborhood settings is shown in cell A2, etc. In each active cell of the matrix, there is some background information and design recommendations. The active links in the matrix are indicated according to the normal web protocol.

I have kept the evaluation form short in hopes that you can respond within the next 7-10 days. I will gladly take more lengthy, detailed comments and reviews at any time.

I hope that you find my work interesting and informative. I am extremely interested in your evaluation of the work. I am also

interested in your suggestions for how it can be improved and any examples that might demonstrate the application of any of these recommendations.

Thank you very, very much for your time and effort in this review.

Sincerely,

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********** Survey **********

Please mark with an X which cells of the matrix you reviewed:

| | Node | Neighborhood | Plaza | Paths | Sacred Site |
|---|---|---|---|---|---|
| Distance | ____/ | ____/ | ____/ | ____/ | (xxx) |
| Spatial Arrangement | ____/ | ____/ | ____/ | ____/ | (xxx) |
| Amenities | ____/ | ____/ | ____/ | ____/ | (xxx) |
| Congruency | ____/ | (xxx) | (xxx) | (xxx) | (xxx) |
| Personal Space | ____/ | ____/ | ____/ | ____/ | (xxx) |
| Territoriality | ____/ | ____/ | ____/ | ____/ | (xxx) |

1. To what extent does the matrix make sense to you in terms of relating design elements with behavior patterns?

   ____/Very Much (5) ____/(4) ____/(3) ____/(2) ____/Very little (1)

   Please make suggestions and/or identify concerns.

2. Please mark with an X any cells in the matrix with conclusions or recommendations that don't coincide with what you have learned from your training and experience?

| | Node | Neighborhood | Plaza | Paths | Sacred Site |
|---|---|---|---|---|---|
| Distance | ____/ | ____/ | ____/ | ____/ | (xxx) |
| Spatial Arrangement | ____/ | ____/ | ____/ | ____/ | (xxx) |
| Amenities | ____/ | ____/ | ____/ | ____/ | (xxx) |
| Congruency | ____/ | (xxx) | (xxx) | (xxx) | (xxx) |
| Personal Space | ____/ | ____/ | ____/ | ____/ | (xxx) |
| Territoriality | ____/ | ____/ | ____/ | ____/ | (xxx) |

3. Please describe the concern(s) identified in question two.

4. Do you believe that this matrix is useful for campus planners and architects and should be developed further?

_____Yes _____No

6. What suggestions or recommendations can you give for how I can/should refine and further develop this information for better understanding and usefulness?

Thank you again for you time and serious consideration of this information. If you want to communicate/discuss this in more detail, I will be very happy to hear from you.

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